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VOLUME 6

FOOD ANNOTATED BIBLIOGRAPHY No. 38

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## INTRODUCTION

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Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would in any case encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

ASSISTANT EDITOR







## 1

**[Comparative studies of sieving methods on green coffee.]**

Ballion, P.; Hahn, D.; Vincent, J.-C.

*Cafe-Cacao-The* 17 (3) 231-240 (1973) [Fr, de, en, es] [Lab. de Chim-Tech. de l'IFCC, Nogent-sur-Marne, France]

Sieving tests on 100 g samples of green Arabica coffee were carried out in order to compare manual sieving according to ISO recommendation No. 1445 with mechanical sieving using horizontal and vertical vibration sifters. To obtain satisfactory results with mechanical sieving, 2 min were required for both horizontal and vertical sifters. Vertical vibration sifters with frequency regulator showed optimum frequency of 80 oscillations/min, and gave better results than horizontal sifters. Manual sieving can give reproducible results if sieves are shaken until grains no longer pass through the higher sieve, but is slower than mechanical sieving. For larger series of analyses, mechanical sieving provides reproducible results with quick and easy manipulation. RM

## 2

**[Studies on the enzyme treatment of coffee beans. IV. Effect of salt concentration on the hydrolysis of mannan and spent coffee grounds by mannanases.]**

Hashimoto, Y.

*Journal of the Agricultural Chemical Society of Japan [Nihon Nogei Kagakkai-shi]* 44 (7) 287-292 (1970) [6 ref. Ja, en] [Fac. of Sci., Osaka City Univ.]

The effects of salt concn. on the reaction catalysed by mannanases obtained from koji cultures of *Rhizopus niveus* and *Aspergillus niger* NRRI 337 were investigated. When mannan isolated from coffee beans was used as a substrate, increasing NaCl concn. activated *Asp. niger* mannanase and extended its hydrolysing limit. *Rh. niveus* mannanase was also activated by NaCl, but the hydrolysing limit was not affected. Optimum concn. of NaCl was 0.1-0.15M for both enzymes. Other salts, such as  $\text{Na}_2\text{SO}_4$ ,  $\text{NaNO}_3$  and KCl, were also found to affect both enzyme reactions in the same manner as NaCl. However, when mannotriose or mannotetraose was used as a substrate, the effect of NaCl concn. was not found. Ultrasonic treatment of mannan increased the hydrolysing limit of *Asp. niger* mannanase but did not affect the action of *Rh. niveus* mannanase. In contrast to the action on isolated mannan, the action of both enzymes on spent coffee grounds was inhibited by NaCl in a low concn. The hydrolysing limit of *Asp. niger* mannanase on spent coffee grounds was one fortieth of that of *Rh. niveus*. [See FSTA (1970) 2 7H859 for part III.] AS

## 3

**[Studies on the enzyme treatment of coffee beans. V. Structure of coffee arabinogalactan.]**

Hashimoto, Y.

*Journal of the Agricultural Chemical Society of Japan [Nihon Nogei Kagakkai-shi]* 45 (3) 147-150

(1971) [10 ref. Ja, en]

The chemical structure of coffee arabinogalactan was studied by enzymatic and chemical methods. The arabinogalactan was hydrolysed by a purified galactanase of *Rhizopus niveus*, and the products were separated by Sephadex G-15 gel filtration and paper chromatography. Arabinose, galactose and a galactobiose were isolated in an approx. equal molar ratio. This galactobiose was identified as 6-0- $\beta$ -galactosyl-galactose. 4 other oligosaccharides were also found in the hydrolytic products in small amounts, and their structures were studied. AS

## 4

**Coffee flavour improvement.**

Clinton, W. P.; Kaplan, J. R.; Capasso, P. J. (General Foods Corp.)

*United States Patent* 3 753 726 (1973) [En]

Bitterness in coffee beverages and products is reduced by incorporation of a food acid, such as citric, fumaric, adipic or mixtures of acetic and pyruvic, in amounts sufficient to produce coffee containing 3-15 mg acid/g soluble coffee solids. IFT

## 5

**[Single-portion package with ground, roasted coffee for preparing a coffee beverage.]** Portionspackung mit gemahlenem Röstkaffee zur Zubereitung eines Kaffeegetränks.

Schmidt, E. (Joh. Jacobs &amp; Co.)

*German Federal Republic Patent Application* 2 144 163 (1973) [De]

A ground-coffee bag has at least partially water-permeable walls for infusion in water, and an air compartment surrounded by coffee for passage of air through the coffee. The dividing wall between the air compartment and the coffee comprises an air- and water-permeable, optionally multi-layered wall. One of the bag walls, preferably the bottom, includes  $\geq 1$  air- and water-permeable concave wall, in the region of which there is an outer wall which is removed before using the bag. The air compartment may be formed by an air-containing, water-absorbent, preferably expandable body, particularly a sponge body, inside the coffee. The air compartment accelerates penetration of water into the bag and therefore allows more thorough infusion. W&Co

## 6

**Determination of chlorogenic acids in green coffee.**

Pokorny, J.; Con, N.-H.; Janicek, G.

*Sbornik Vysoke Skoly Chemicko-Technologicke v Praze, E* No. 33, 27-31 (1972) [13 ref. En, cs, de] [Fac. of Food and Biochem. Tech., Inst. of Chem. Tech., Prague, Czechoslovakia]

The content of chlorogenic acids was determined in 22 samples of green coffee after Weiss [J. Ass. off. agric. Chem. (1953) 36, 663]. The results were compared with those obtained after Neubauer and Löwenthal [J. prakt. Chem. (1860) 81, 150; Z.







anal. Chem. (1871) 10, 1], after von Schroeder [O. Windhausen in Handbuch der Lebensmittelchemie (1935) Vol. 2, part 2, p. 1175, J. Springer, Berlin] and after Löwenthal and von Schroeder [Z. anal. Chem. (1886) 25, 121] (methods used for tannin determination). The repeatability of all the methods was the same but the results were different. The correlations between all the methods were significant. The method of Neubauer and Löwenthal can be used for the determination of chlorogenic acids when suitable correction factors are used in calculations. AS

## 7

### Rapid fermentation of coffee.

Butty, M.

*Kenya Coffee* 38 (448) 214-224 (1973) [1 ref. En] [E. African Ind. Res. Organisation, Nairobi, Kenya]

A practical method for use in the field which cuts the time required to degrade mucilage to <12 h was developed. An inoculum derived from "lights" which had been allowed to overferment for 5 days was used to demucilage pulped "first" overnight, 10 kg of "lights" producing enough for 1000 kg ripe berries at initial pH of 5.5-6.0. A large number of trials showed that the rapid fermentation method had little or no effect on final coffee quality compared to the natural 2-stage method. It can be used over a wide range of temp., altitudes and hybrid species of coffee and is recommended for use in existing coffee factories. When new factories are built, it should be incorporated in the basic design. RM

## 8

### Roast odors trapped at GF/Montreal.

Anon.

*Food Engineering* 45 (10) 123-124 (1973) [En]

The advanced pollution control system installed at General Foods, Montreal, coffee-roasting plant is described. The coffee roaster exhaust entering the system is made up of particulates and smoke which consists of fats, oils and waxes, aldehydes and organic acids. These exhaust gases enter the unit through a gas chamber and pass into the heat-exchange medium, a bed of inert ceramic material. Here gases are preheated before incineration by absorbing heat which was stored in the previous cycle. Gases then enter the incineration zone where they are held at about 1500°F for  $\leq 0.5$  s. The hot gases pass through a second bed of ceramics where heat is lost, and are exhausted as clean gas. AA

## 9

### Rancidity degree of roasted coffee.

Pokorny, J.; Zwain, H.; Janicek, G.

*Sbornik Vysoke Skoly Chemicko-Technologicke v Praze*, E No. 28, 73-78 (1970) [10 ref. En, cs, de] [Dept. of Food Chem., Inst. of Chem. Tech., Prague 6, Czechoslovakia]

Commercial samples of Czechoslovak roasted coffee do not contain excessive amounts of oxidation products and have a fairly constant degree of oxidation. The average content of free fatty acids was 0.4%, peroxide value was 25 m-equiv./kg, I value 82, benzidine value 0.9, and thiobarbituric acid value 0.7. The relatively low % of free fatty acids shows that green coffee used for roasting was not stored for more than about 1 yr as substantially higher values were found in green coffee stored for 3 yr. Pale beans have no higher rancidity than normal roasted coffee beans and lower the flavour quality by the presence of compounds other than lipid oxidation products. AS

## 10

### Technology of soluble coffee production.

Sivetz, M.

*Tea and Coffee Trade Journal* 145 (3) 37-39, 53-54 (1973) [En]

The technology of producing spray-dried, agglomerated and freeze-dried coffee is reviewed, with reference to effect of quality of coffee beans; solubles yield from ground roast coffee in extraction; fusion agglomeration; counteracting flavour degradation by additions of volatile aromas and/or expelled coffee oil or drying more concn. extracts (prepared by freeze-concn. or evaporation); and removing tars by desludging centrifuges and settling. Various evaporators are briefly described. RM

## 11

[Production of Floralp coffee cream in portion packs in the Gossau butter factory.] Floralp-Kaffee-Rahm; Die Herstellung von haltbarem Kaffeerahm in Portionen in der Butterzentrale Gossau. Kaufmann, C.

*Schweizerische Milchzeitung* 99 (86) 655-656 (1973) [De] [Gossau/SG, Switzerland]

Production of UHT coffee cream with aseptic packaging in portion packs in Gossau, Switzerland, is briefly described with particular reference to the aseptic machine used. In the machine, developed by Fa. Hamba and Ing. Büro Frölich, prefabricated containers are first sterilized by injection of  $H_2O_2$ , dried with sterile air, filled with UHT-treated cream and sealed; the lids are sterilized by IR radiation. The whole operation takes place in a sterile part of the packaging machine, where aseptic conditions are obtained initially with  $H_2O_2$  and maintained by provision of sterile air under pressure above atmospheric. The capacity is 18 000 packs/h. FL

## 12

### Controlling coffee roaster emissions.

Barnett, J. H.; Pilon, D.

*Instrumentation in the Food and Beverage Industry* 1, 31-42 (1972) [7 ref. En] [General Foods Ltd., Montreal, Canada]







Roasting odours have been identified as the prime air pollution problem in the coffee roasting industry. Details of the roasting process and the resulting emissions are outlined, along with potential emission control devices. Specific experience obtained at General Foods Ltd. Montreal Plant using high temp. incineration equipment with heat recovery is described. AS

### 13

**Determination of soluble solids in roasted coffee.**  
Vree, P. H.; Yeransian, J. A.

*Journal of the Association of Official Analytical Chemists* 56 (5) 1126-1129 (1973) [6 ref. En] [General Foods Corp., 250 North St., White Plains, New York 10625, USA]

6 laboratories participated in a study of the determination of soluble solids in 9 samples of roasted and ground coffee by 3 methods. In a previous report the reproducibility of the Navellier method and of the method used by the European Decaffeination Association (EDA) was found to be comparable to the current AOAC method. Interlaboratory comparisons show better agreement for the Navellier and EDA methods, with somewhat higher values than the AOAC method. The EDA method has been adopted as official first action to replace method 15.012, which was repealed, official first action. AS

### 14

**Coffee concentration.**

Ganiaris, N.

*United States Patent* 3 762 177 (1973) [En]

A staged freeze concn. process is described for concentrating coffee solutions in which ice crystals are removed from the system after the first stage from less concentrated coffee solution and also removed from the more concentrated coffee solution in the second stage for addition to incoming feed. IFT

### 15

**Coffee roasting.**

Mahlmann, J. P. (General Foods Corp.)

*United States Patent* 3 762 930 (1973) [En]

Green coffee either whole, flaked or ground is subjected to heat and a mechanical force preferably containing a shearing component sufficient to roast the coffee. The roasting produces a coffee product having higher soluble solids whether atmospherically or pressure extracted compared to a conventional hot air roast. IFT

### 16

[Essences, aromatic substances and raw materials.

II. Composition and labelling of coffee liqueurs.]

Essenzen - Aromen - Grundstoffe. II. Kaffeelikör - seine Zusammensetzung und Bezeichnung.

Schöne, H. J.

*Alkohol-Industrie* 86 (11) 224-230 (1973) [10 ref. De] [St. Chem. Untersuchungsanstalt, Munich, Federal Republic of Germany]

Legislation for coffee liqueurs in the Federal Republic of Germany is discussed, with reference to composition, manufacture and labelling. 20 commercial samples were analysed for sp. gr., alcohol %, extract content, caffeine concn. and coffee content. On the basis of these results, recommendations are given for further legislation. AJDW

### 17

[Critical study of some methods for the determination of chlorogenic acid.]

Szilas-Kelemen, M.; Barath, A.

*Élelmiszervizsgálati Közlemények* 19 (4) 161-176 (1973) [24 ref. Hu, ru, de, en] [Dept. of Food Chem., Tech. Univ., Budapest, Hungary]

Volumetric, spectrophotometric and chromatographic methods for determination of chlorogenic acid in decaffeinated powdered raw Robusta coffee were compared. Results showed that spectrophotometric methods (the AOAC method and a method based on formation of a chlorogenic acid-boric acid-complex) were the most reliable; the AOAC method gave a lower scatter of results. A TLC variant of standard paper chromatographic methods is described; the running period is reduced to 3 h, and spot definition is improved. IF

### 18

**Separation of components of aroma concentrates on the basis of functional group and aroma quality.**  
Palmer, J. K.

*Journal of Agricultural and Food Chemistry* 21 (5) 923-925 (1973) [7 ref. En] [Dept. of Nutr. & Food Sci., Massachusetts Inst. of Tech., Cambridge, 02139, USA]

A technique is described which facilitates identification of the individual aroma-bearing constituents in complex aroma concentrates. Fractionation by functional group class (and to some extent by mol. wt. within classes) is accomplished by elution from silica gel at 0°C with Freon or ether in Freon. Fractions with characteristic aroma are located by sniffing after the evaporation of most of the solvent. Identification by GLC-MS or other means can then be concentrated on aroma-bearing fractions which contain relatively few components of the same functional class. The preliminary separation can be accomplished on an analytical or preparative scale and the elution conditions are easily modified to achieve the desired degree of separation for a particular aroma concentrate. Results obtained with bananas, coffee, and Blue cheese are presented. AS





## 19

[The coffee and tea processing industry, 1962-1972: marked concentration and production increase.]

Stark konzentriert und zunehmend produktiver: Die Kaffee und Tee verarbeitende Industrie 1962-1972.

Rotzoll, F.

*Kaffee und Tee Markt* 23 (14) 3-4 (1973) [De]  
[Deutscher Kaffee-Verband eV, Federal Republic of Germany]

Information about coffee and tea processing in the Federal Republic of Germany in 1962-1972 includes the following data for 1962 and 1972 respectively: number of undertakings, 167 and 81; annual turnover, DM 2 272 300 and 4 126 354 (not including VAT); number of employees, 15 527 and 15 025; annual exports as % of turnover, 0.19 and 1.87. SKK

## 20

World coffee production will decline almost 9 per cent in 1973-1974.

United States of America, United States Department of Agriculture

*Kenya Coffee* 38 (451) 305-316 (1973) [En]

Figures from the USDA Foreign Agricultural Service for 1973-1974 include (million bags): estimate of the world coffee crop, 66.9; exportable production, 46.9; and estimated world import demand, 54. Corresponding figures for 1972-1973 included: production, 73.2; and exportable production, 53.8. Production of green coffee, which is tabulated by continent and country, was for 1972-1973 and 1973-1974 ('000 bags): total, 73 212 and 66 847; exportable, 53 774 and 46 872. Figures are also given for exports by continent, exports by the 10 principal producing countries as % of world total, and exports by country of origin. RM

## 21

[Packaging of roast coffee, with special reference to aroma retention.] Überblick über den heutigen Stand der Verpackungstechnik für Röstkaffee unter besonderer Berücksichtigung der Aromaerhaltung. Radtke, R.

*Deutsche Lebensmittel-Rundschau* 69 (11) 404-410 (1973) [9 ref. De] [Inst. für Lebensmitteltech. und Verpackung, Tech. Univ., Munich, Federal Republic of Germany]

Developments in packaging of ground and unground roasted coffee are discussed with reference to shelf-life, retention of flavour and aroma, packaging without special measures for aroma retention, packaging with exclusion of O<sub>2</sub>, problems of liberation of CO<sub>2</sub> from roasted beans, evacuated flexible packs with limited gas permeability, equipment and methods for packaging coffee in flexible plastics packs, and trends in coffee packaging in the Federal Republic of Germany. AJDW

## 22

Coffee infusion package.

Kim, J.

*United States Patent* 3 767 420 (1973) [En]

A package for producing a beverage such as coffee is described which includes a sealed plastics bag and at least one beverage cone made of filter paper within the bag. IFT

## 23

Green bean decaffeination.

Forbes, M. R.; Panzer, H. P.; Yare, R. S. (General Foods Corp.)

*Canadian Patent* 934 217 (1973) [En]

Decaffeination of green coffee is achieved by extraction with fluorinated hydrocarbons. IFT

## 24

Coffee bean processing.

Roselius, W.; Vitzthum, O.; Hubert, P. (HAG Aktiengesellschaft)

*United States Patent* 3 770 456 (1973) [En]

Undesirable irritants are removed from raw coffee beans without reduction in caffeine content by extraction with low boiling organic solvent at a temp. above the bp of the solvent but below 80°C. IFT

## 25

Coffee acid component removal.

Pitchon, E. (General Foods Corp.)

*Canadian Patent* 934 218 (1973) [En]

Roasted and ground coffee is subjected to a dearomatization, steaming operation prior to percolation of the coffee. The flow of extract in the percolators is then controlled such that it passes through the steamed coffee and then through a bed of unsteamed coffee. The unsteamed coffee deacidifies the extract which contains acids picked up from the steamed coffee. IFT

## 26

Upgrading green coffee.

Ponzoni, G. H.; Protomastro, M. G.; Stefanucci, A. (General Foods Corp.)

*United States Patent* 3 767 418 (1973) [En]

Green coffee is upgraded in a process involving contacting the coffee with water and subjecting the mixture to elevated temp. and pressures. The moisture content of the green coffee and the steam pressure are carefully controlled to avoid undue expansion. IFT





## 27

[Heat, mass and momentum transfer in the continuous freezing and freeze-drying of spherical coffee particles on an agitated bed.]

Dauvois, P.; Bonteil, R.

*Proceedings of the International Congress of Refrigeration (13th Washington) 2*, 337-346 (1971, publ. 1973) [5 ref. Fr, en] [Sepial, Clichy, France]

A pilot plant experiment is described in which the coffee extract is sprayed into a freezing tower containing a refrigerated gas. The partly-frozen drops fall into a fluidized bed where they are completely frozen and subsequently freeze-dried. The thickness of the fluidized bed is varied during the drying process. The economics of this continuous process compare favourably with those of the cyclic freeze-drying process. IFT

## 28

**Coffee bean grinding.**

Mahlmann, J. P.; Scarsella, E. (General Foods Corp.)

*Canadian Patent* 935 416 (1973) [En]

Roasted coffee beans are subjected to a 2-stage comminution process, compression flaking followed by granulation, to obtain a roasted and subdivided coffee product with unique physical and organoleptic qualities. IFT

## 29

**Light-milled roast and ground coffee.**

McSwiggin, J. R. (Procter & Gamble Co.)

*United States Patent* 3 769 031 (1973) [En]

Light-milled, cell-distorted roast and ground coffee is described wherein the light-milled coffee has a bulk density equal to that of conventional roast and ground coffee products. The product has some cell fracture and partial cell disruption and therefore has increased extractability. IFT

## 30

**Coffee roasting.**

Touba, A. R. (General Mills Inc.)

*United States Patent* 3 767 417 (1973) [En]

Coffee beans are roasted between a pair of heated surface which exert a compressive force on the bean sufficient to reduce their thickness but insufficient to crush them. IFT

## 31

**Coffee flavor improvement.**

Balling, T. T.; Leonard, R. J.; Ponzoni, G. B.; Protomastro, M. G.; Stefanucci, A. (General Foods Corp.)

*Canadian Patent* 934 216 (1973) [En]

Undesirable aroma components and gases are removed from coffee beans during roasting by intermittent additions of moisture to drive out volatiles. IFT

## 32

**Coffee roasting.**

Mahlmann, J. P.; Pinzone, S. M. (General Foods Corp.)

*Canadian Patent* 934 214 (1973) [En]

Blends of green coffee subdivided to a fine state are roasted by conventional means and quenched in inert sub-zero temp. fluids to produce flavour substantially the same as that of blends of whole roasted beans. IFT

## 33

**Coffee flavor balancing.**

Stefanucci, A.; Yadowsky, S. (General Foods Corp.)

*Canadian Patent* 934 215 (1973) [En]

Single varieties of coffee are divided into portions and each portion roasted to a separate and discernible average roasted colour. The portions are then combined to provide on infusion, improved flavour characteristics compared to the same variety roasted to its optimum colour. IFT

## 34

**Coffee extraction.**

Orozovich, G. E. (General Foods Corp.)

*Canadian Patent* 934 219 (1973) [En]

Roasted coffee, in the form of whole beans or ground, is contacted with cold water and the mixture separated under pressure to obtain a quality coffee extract and partially extracted coffee which can be further processed. IFT

## 35

**Dried coffee extract.**

Chaplow, R. A.; Hodgman, R. A. (General Foods Ltd.)

*United States Patent* 3 765 910 (1973) [En]

Ice, which is separated from the effluent slurry of a coffee extract crystallizer, is melted, concn. and added back to the mother liquor. Any insolubles present in the conc. extract are removed by clarification in a desludger type centrifuge. The clarified extract is then frozen and freeze-dried. IFT

## 36

**Aromatized coffee extract.**

Friedman, H. H.; Pitchon, E.; Cascione, A. S.; Banks, B. L. (General Foods Corp.)

*Canadian Patent* 934 220 (1973) [En]

Process is described in which an extracting medium is introduced into a column of coffee which had been subjected to steaming under isolated





conditions before the column is vented to the atmosphere. IFT

### 37

#### **Aroma-enriched coffee products.**

Lubsen, T. A.; Strobel, R. G.; Reinhart, R. N.; Patel, J. M. (Procter & Gamble Co.)

*United States Patent* 3 769 032 (1973) [En]

Aromatized instant coffee products are prepared by the dropwise addition of aroma frost-enriched coffee oils to coffee products by using a syringe member which is extended from the open end of a container to near the bottom. While the syringe is being pulled upward out of the container, a predetermined amount of the coffee oil is injected. IFT

### 38

#### **Coffee aroma recovery.**

White, W. V. (General Foods Corp.)

*United States Patent* 3 767 828 (1973) [En]

A method of stripping desirable volatiles from roasted coffee without degrading the quality is described in which the coffee is contacted with steam in a confined vol. at superatmospheric pressure by wetting the roasted coffee and heating. The pressure is then relieved and the escaping vapour is condensed. IFT

### 39

#### **Coffee agglomerates.**

Sienkiewicz, B.; Bagley, F. A. (General Foods Corp.)

*United States Patent* 3 767 419 (1973) [En]

Coffee agglomerates are made from soluble coffee, involving the use of upper and lower jets of steam which impinge against at least one falling curtain of powder at a substantial angle so as to disrupt the said curtain into agglomerates which are then wetted and redirected into a drying zone. IFT

### 40

#### **Agglomerated coffee.**

Kaplan, J. R.; Huste, A. (General Foods Corp.)

*Canadian Patent* 934 221 (1973) [En]

Process is described in which a minor portion of an enhanced coffee powder is agglomerated with a major portion of an unenhanced coffee powder. IFT

### 41

#### **Pelletized coffee package.**

Makwinski, J. A.; Rehman, W. C.; Spotholz, C. H. (General Foods Corp.)

*United States Patent* 3 770 457 (1973) [En]

Roasted and ground coffee is degassed, then heated to a temp. of from 90°F to about 110°F prior to being compressed to form a pellet which is then packaged in a porous filter material. IFT

### 42

#### **A simple technique for stored products infestation surveys.**

McFarlane, J. A.; Warui, C.

*Tropical Stored Products Information* 24, 17-24 (1973) [2 ref. En] [Tropical Products Inst., Tropical Stored Products Centre, London Road, Slough SL3 7HL, Bucks., UK]

Use of an insect-trap-bag for assessing the abundance of insect pests of stored products in warehouses, ships and other transport vehicles is described. The trap contains 600 g sieved disinfested maize grain or green coffee beans. After exposure for standard times in various situations, the bags are emptied and the contents sieved to remove insects for counting. Results of trials carried out in transit sheds and in holds of cargo ships in Mombasa, Kenya are reported in detail. The method generally correlated well with visual inspection techniques, except for months and some beetles. The effect of exposure period, the relationship between number of insects trapped and total population, and the effect of minor quality changes in the trap-bag are discussed. W&Co

### 43

#### **[Efficient method for obtaining coffee extract.]**

Dryagileva, L. N.

*Molochnaya Promyshlennost'* No. 8, 33-34 (1973)

[Ru] [Volokonovskii Molochnokonservyi, Kombinat, Belgorodskoi, Oblasti, USSR]

Since Sept. 1972, the Volokonovka milk preserving factory has been using a filtration centrifuge for the preparation of coffee extract for the manufacture of coffee-flavoured condensed milk. The changeover to the centrifugal technique enabled the output of coffee flavoured product to be increased to 40 000 'standard' tins/shift (vs. max. of 40 000/day using the old sedimentation method), improved the quality of the product and labour productivity and substantially reduced the costs. FL

### 44

#### **Flavor enhancement.**

Parliment, T. H.; Epstein, M. F.; Clinton, W. P.; Soukup, R. J. (General Foods Corp.)

*United States Patent* 3 767 425 (1973) [En]

Flavour enhancement in coffee flavoured foodstuffs is achieved by the addition of 2-ethyl-3-methoxypyrazine derivatives. IFT

### 45

#### **The small scale manufacture of soluble coffee.**

Kamath, J.

*Report, Tropical Products Institute* G82. v + 38pp.





ISBN 0 85954 017 0 (1973) [9 ref. En, fr, es]  
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Inn Road, London WC1X 8LU, UK]

Information in this report is arranged under the following 5 chapter headings: Introduction (pp. 3-4); Outline of the manufacturing process (pp. 5-6); Implications of the cost models (returns on capital compared, internal rate of return, effects of varying the assumptions, economies of scale, cost structure, and is the small scale manufacture of soluble coffee feasible?) (pp. 7-10); Further application of the model (mixing chicory with coffee, use of glass containers only) (pp. 11-12); and Current trends (spray-dried, freeze-dried, and agglomerated coffee) (pp. 13-14). 4 appendices are included: Equipment (green coffee cleaning, coffee roasting, grinding, extraction, spray-drying, automatic jar packing line and auxiliary equipment) (pp. 15-25); Tables (pp. 26-36) - Production costs, sales and return on capital (p. 29), Total fixed investment at 3 scales (p. 30), Physical quantities and Indian prices of inputs (p. 31), Requirements and costs of management and labour (p. 32), Selling price per unit and total income (p. 33), Cashflows over 10 yr (p. 34), Tax allowances and total depreciation (p. 35), Discounted cash flow and internal rate of return (p. 36); List of firms and organizations contacted (p. 37); and References (p. 38). VJG

## 4 6

### Product collapse during freeze drying of liquid foods.

Bellows, R. J.; King, C. J.

*AIChE Symposium Series* 69 (132) 33-41 (1973) [16 ref. En] [W. Regional Res. Lab., USDA, Berkeley, California 94710, USA]

When freeze-drying of liquid foods is conducted above the collapse temp., the solute matrix loses its shape (collapses) and the resulting product has poor aroma retention, poor rehydration characteristics and uneven dryness. Differential scanning calorimetry and viscosity measurements, coupled with visual observation and measurement of rates, during freeze drying of a number of different materials including sugar solutions, fruit juices and coffee extract, confirmed that collapse reflects a quantitative balance between surface tension and viscosity of unfrozen concentrate.

AA

## 4 7

### [Improvement of keeping quality: product protection by packaging.]

Haltbarkeitsverlängerung: Produktschutz bei der Lebensmittelverpackung.

Domke, K.

*Ernährungswirtschaft* No. 9, 666-674 (1973) [8 ref. De] [Fr. Hesser AG, Stuttgart-Bad Cannstadt, Federal Republic of Germany]

The growing demand for protective packaging of foods is discussed, with special reference to shelf-life improvement, packaging costs and the replacement of cans by plastics or laminate packs.

As an example, the relationship between packaging method and quality changes in tea and coffee is discussed. IN

## 4 8

### [Improved method of instant coffee production.]

Vol'per, I. N.; Il'enko-Petrovskaya, T. P.; Lazarev, E. N.; Solov'eva, T. Ya.

*Konservnaya i Ovoshchesushil'naya*

*Promyshlennost'* No. 4, 10-11 (1973) [Ru]

Instant coffee manufactured in the USSR contained 3.0-3.1% moisture, 8.8-9.6% ash, 4.5-5.1% caffeine, 5.2-7.4% chlorogenic acid, 9.0-9.6% sugar, 2.6-3.4% total N and 1.5-1.6% oil. Green coffee beans contained 12.2% oil, roasted coffee beans 11.5%. The sediment after extraction contained 14.8-22.14% oil. Acid numbers were 7.5-8 mg KOH in coffee beans and 15 in sediment. According to the I number (43-56) coffee oil is characterized by slight reactivity. Volatile carbonyl compounds were determined spectrophotometrically, and volatile aroma substances by gas chromatography; aroma number was determined by oxidation with potassium permanganate. When roasted coffee beans were taken as the standard (100%), granulated coffee contained 98%, caffeine extract 44% and instant coffee 20% of the original amount of volatile carbonyl compounds. Corresponding values for volatile aroma substances were 86, 15 and 14%, for aroma number 82, 71 and 53%. Laboratory freeze-drying equipment was used to dry caffeine extract under partial pressure at 10-25°C. If the aroma number of roasted coffee beans were taken as 100%, that of caffeine extract was 83-87%, of spray-dried extract 47-56% and of freeze-dried extract 66-81%. Best results were obtained with Santos and Robusta coffees. Improvement in instant coffee was attained by reducing the extraction period, at the expense of yield. Hydrothermal treatment of green coffee beans, IR roasting and freeze-drying require further testing. STI

## 4 9

### [Ground roasted coffee with a long shelf-life.]

Gemahlener Röstkaffee für den Langzeitumschlag. Jankus, A.; Jankus, M.

*Lebensmittel-Industrie* 20 (12) 545-546 (1973) [3 ref. De, en, ru] [VEB Kaffee- Nahrungsmittelwerke, Halle (Saale), German Democratic Republic]

A process for manufacture of ground roasted coffee with a shelf-life of  $\geq 3$  months without significant quality deterioration is described. The process is based on cold grinding of the coffee, and packaging of the ground product in aroma-impermeable flexible bags. IN

## 5 0

### [Method of producing decaffeinated coffee.]

Verfahren zur Herstellung von koffeinfreiem Kaffee.

Rothfos, J. B.; Mohr, E. (Germany, Federal Republic of, Inge Institut für





Genussmittelforschung GmbH)

**German Federal Republic Patent Application**  
2 150 729 (1973) [De]

Caffeine is removed from coffee by extraction with water in 2 stages: nearly all the caffeine is removed in the first stage, in which a first liquid extract is obtained containing approx. 18% DM, 3% reduced sugar, 6% caffeine, and 14% ash (based on DM). The second stage, using fresh water, is carried out at 170°C, to provide a second liquid extract containing 10-14% DM, 0.02% caffeine and 3% ash (based on DM). The second extract is freeze- or spray-dried to provide a product containing 0.03% caffeine. It tastes the same as ordinary coffee extract, and does not contain any residues of foreign substances, e.g. organic solvents or ion exchangers used in known decaffeinating processes. W&Co

## 51

[Studies on coffee and coffee substitutes. XV. Polysaccharides in extracts of Arabica coffee.]  
Untersuchungen an Kaffee und Kaffee-Esatz. XV. Polysaccharide in Extrakten eines Arabica-Kaffees. Thaler, H.

**Chemie Mikrobiologie Technologie der Lebensmittel** 3 (1) 1-7 (1974) [7 ref. De, en, fr] [Inst. für Lebensmittelchemie, Tech. Univ., Brunswick, Federal Republic of Germany]

Investigations of coffee extracts derived by extraction of Columbia Arabica coffee (extraction yields of 36-53%) showed, up to 43% yield, first a rapid then a slower increase in total polysaccharide content (galactan, mannan, glucan and araban). Above 43% extraction yield the polysaccharide content decreased. The amounts of total carbohydrates released by the roasted coffee also increased up to 43% extraction yield, but then remained constant. During the extraction process highly polymerized galactan and mannan were dissolved in increasing amounts whereas the amounts of less polymerized fragments reached a max. and thereafter decreased. In all the extracts only very small amounts of glucan and araban were present. Their contents showed no significant variations. The investigations showed hydrolysis of polysaccharides, caused by the extraction process, to be unlikely. [See FSTA (1971) 3 2H142 for part XIV.] AS

## 52

**Liquid chromatography of xanthines, analgesic drugs and coffee.**

Murgia, E.; Richards, P.; Walton, H. F.  
**Journal of Chromatography** 87 (2) 523-533 (1973) [16 ref. En] [Dept. of Chem., Univ. of Colorado, Boulder, 80302, USA]

This paper describes the use of a 4% cross-linked sulphonated polystyrene cation-exchanger in the sodium or ammonium form as a versatile stationary phase for the chromatography of UV absorbing organic compounds. The eluent can be electrolyte-free 25% ethanol or may contain added buffers. The

method was tested by examining the dissolved constituents of boiled coffee. The presence of caffeine, trigonellin and caffeic acid was demonstrated. Using a formate buffer of pH 3.65, 5 or 6 major peaks were obtained with minor peaks that could be characterized at higher resolution. Differences between coffees were noticeable. For the quantitative measurement of caffeine and trigonellin an electrolyte-free eluent, with the resin in the ammonium form, would be preferable. PG

## 53

[Mineral nutrition and fertilization of the coffee plant on shaly soil in the Ivory Coast. IV. Influence of mineral fertilization on fruit composition.]

Verliere, G.

**Cafe-Cacao-The** 17 (4) 269-280 (1973) [Fr, de, en, es] [Centre Orstrom, Noumea, New Caledonia]

In a factorial experiment using NPK 2<sup>3</sup> with 3 replications and a density of 1600 plants/ha, effects of fertilizers on the following characteristics were studied: bean wt./shell wt. ratio, size and wt. of bean, mineral composition of parchment and beans, and caffeine content of beans. The following results are tabulated: shelled yield, % grade 1 beans, 1000 grain wt., N, P, K, Ca, Mg, Fe, Mn, Zn and Cu contents of parchment and beans, and caffeine content of beans (% of DM). Mineral manuring acted more on composition of shells than of beans and had no effect on shelled yield, bean size or wt. Anions seemed to have more effect on fruit composition than cations. Ca and Fe contents were unaffected by any treatment. N fertilization increased N and Mn and reduced P in parchment and beans; P increased P and reduced N and Cu in parchment and beans and increased K in beans; K increased K in parchment. There was thus some antagonism between the effects of N and P fertilization. Caffeine was increased by N. Factorial analysis of the results made it possible to differentiate the main effects of N, P and K by first or second order interactions. [See Cafe-Cacao-The (1973) 17 (3) 211 for previous parts.] RM

## 54

**Freezing of coffee extract to produce a dark colored freeze-dried product.**

Barnett, S.

**AIChE Symposium Series** 69 (132) 26-32 (1973) [7 ref. En] [General Foods Corp., White Plains, New York 10625, USA]

Studies showed that control of freezing conditions for the extract, both by inhibition of supercooling and by low initial freezing rates, was necessary to produce the desired dark-coloured freeze-dried product which closely approximates the colour of roast ground coffee. It is suggested that ice crystal seeding of the extract at the ice point, in combination with profiled temp. slab freezing, provides a commercially feasible means of producing dark-coloured freeze-dried soluble coffee products. AA





## 55

[Method of producing powders, having the colour of the starting material, from aqueous extracts of plant products by freeze-drying.] Verfahren zum Herstellen von Pulvern mit der Farbe des Ausgangsgutes aus wässrigen Extrakten pflanzlicher Produkte durch Gefriertrocknen. Sylla, K. F.; Risse, H.; Koch, K.-D. (Hag AG) *German Federal Republic Patent Application* 2 152 793 (1973) [De]

Instant coffee powder having a sp. gr. of 200-250 g/l. is made in a one-step process from an aqueous coffee extract having a concn. of >300 g/l., preferably 350-450 g/l. Simultaneously with or prior to a freezing operation, the aqueous extract is foamed, using as propellant an inert gas, preferably  $N_2O_2$ , Ar and/or halogenated fluorine hydrocarbon, preferably chlorodifluoromethane. The substance is then freeze-dried. W&Co

## 56

[Method of producing powders, having the colour of the starting material, from aqueous extracts of plant products by freeze-drying.] Verfahren zum Herstellen von Pulvern mit der Farbe des Ausgangsgutes aus wässrigen Extrakten pflanzlicher Produkte durch Gefriertrocknen. Sylla, K. F.; Risse, H. (Hag AG) *German Federal Republic Patent Application* 2 153 613 (1973) [De]

Instant coffee powder having a sp. gr. of 200-250 g/l. is made in a one-step process from an aqueous coffee extract having a concn. of >300 g/l., preferably 350-450 g/l. The aqueous extract is prefrozen to a pumpable crystalline pulp and then simultaneously with or prior to the freezing operation foamed with a propellant, e.g.  $N_2O$ , Ar and/or a halogenated fluorine hydrocarbon, preferably chlorodifluoromethane. The product is then freeze-dried. W&Co

## 57

[Pectin assimilation by microorganisms.]

Pee, W. van; Castelein, J. M.

*Industries Alimentaires et Agricoles* 89 (11) 1589-1593 (1972) [10 ref. Fr, de, en] [Univ. Nat., Campus Kinghasa, Republic du Zaïre]

During fermentation of green coffee the mucilage layer of pectins disappears; a method is described for study of the pectolytic activity of microorganisms. Pectin substances were determined by degradation to galacturonic acid, which was measured by the colour reaction with carbazol and  $H_2SO_4$ , using pure galacturonic acid monohydrate as a standard. Pectins were first separated from interfering sugars and starches by repeated extraction into 63% ethanol (working details are given). Pure cultures of *Erwinia* spp. (from collections) and 2 *Erwinia* cultures and 1 *Bacillus cereus* culture isolated from fermenting coffee were studied. The organisms were grown in a medium with pectin as the sole carbon source [devised by

Kraght & Starr, *Arch. Bioch. Biophys.* (1953) 42, 271] and the residual pectin was estimated. Assimilation of pectin by each sp. is shown in tables and graphs. Highest activity was shown by *E. carotova*, which showed rapid assimilation within 7 h and total assimilation in 72 h. Other spp. showed pectolytic activity, but not reaching total assimilation, in the descending order *E. dissolvens* (from fermenting coffee), *E. ananas*, and *E. atroseptica*; *B. cereus* showed only slight activity and *E. silicis* and *E. amylovora* were non-pectolytic. ELC

## 58

[1972 was not an outstanding year for beverages: excerpts from the 1972 report of the Ifo Institute in Munich.] 1972 war kein überschäumendes Getränkejahr. Aus dem Jahresbericht 1972 des Ifo-Instituts, München. Breitenacher, M.

*Flüssiges Obst* 40 (10) 416-417 (1973) [De]

Data are tabulated for the Federal Republic of Germany on consumption of, and expenditure on, alcoholic beverages, soft drinks, coffee, coffee substitutes, tea and milk. They cover 1965-1972 and are derived from various sources. SKK

## 59

Food processing with chlorinated solvents. Valle-Riestra, J. F.

*Food Technology* 28 (2) 25, 28-30, 32 (1974) [10 ref. En] [Dow Chemical Co., Walnut Creek Res. Center, California 94598, USA]

Chlorinated hydrocarbons (methylene chloride, methyl chloroform, trichloroethylene and perchloroethylene) are being used in various food processing applications. This article reviews the chemical and physical properties, toxicology, and recovery of these solvents; their current applications, which include production of hops extract for beer and decaffeination of coffee; and their potential uses in peeling of fruits and vegetables, freezing, dehydration, extraction of oils from seeds, and treatment of waste. IFT

## 60

[Container.] Behälter.

Lepper, W.

*German Federal Republic Patent Application* 2 160 921 (1973) [De]

A cylindrical box with one closed end, for packaging coffee, tea, chocolates, cocoa or similar products, is closed at the other end by a lid which consists of a gramophone record protected by a detachable film. A lid knob is releasably inserted in the centre hole. Elastic clamping devices hold the lid in position. W&Co





## 61

[Infusion bag for automatic filling for tea, coffee and other extractable materials.] Aufgussbeutel zum Selbstfüllen für Tee, Kaffee oder andere extrahierbare Stoffe.

Kneidl, F.

**German Federal Republic Patent Application**

2 217 927 (1973) [De]

The bag, made in one piece, can be of material of the filter-paper type. Front and back are heat-sealed or glued at the edges. There is a fold at the bottom to enable the bag to open out during the swelling of the tea. The filling aperture is closed by means of a flap carrying a folded extension.

W&Co

## 62

[Process of producing sparkling wine containing coffee.] Verfahren zur Herstellung von kaffeehaltigem Schaumwein.

Pietz, R. (VEB Rotkäppchen-Sektkellerei)

**German Federal Republic Patent Application**

2 220 648 (1973) [De]

A liqueur base consisting of 2 parts coffee, 2 parts wine and 3 parts sugar is mixed with the raw sparkling wine. The mixture is kept at a pressure of 3-5 kgf/cm<sup>2</sup> and a temp. of 2-4°C for 24 h. Gelatin is added to prevent precipitation or cloudiness and to improve the flavour. Statibilization takes place at low temp., preferably at -4°C for 4 days. After filtration and bottling, the bottles are kept at 15°C for 21 days. The wine has the typical flavour of both components.

W&Co

## 63

**Coffee extract concentration.**

Struthers Scientific & International Corp.

**British Patent** 1 335 021 (1973) [En]

A partially frozen coffee extract is centrifuged to separate out ice crystals, which are partially melted and filtered. The filtrate is used as a wash liquid spray in the centrifuge.

IFT

## 64

**Coffee processing.**

Niven, W. W., Jr. (Folger Coffee Co.)

**United States Patent Reissue** 27 841 (1973) [En]

Instant coffee is produced by a dual extraction process in which the 2 extracts are ultimately combined to provide the final product. In the 1st extraction, water at 21°F is added to ground coffee in a ratio of 2.5 to 4.5 parts water to coffee to produce an extract having approx. 7% by wt. of water-soluble components. The remaining grounds are then subjected to the 2nd extraction process.

IFT

## 65

**Balanced coffee flavours.**

Stefanucci, A.; Yadlowsky, S. (General Foods Corp.)

**United States Patent** 3 780 197 (1973) [En]

High quality coffee is divided into portions, each of which is roasted to a separate and discernible average roast colour. The roasted portions are then ground to a fine particle size and combined with low quality coffee ground to a coarse particle size.

IFT

## 66

**[Silo storage of screened green coffee under conditions of natural ventilation.]**

Jordao, B. A.; Garrutti, R. S.; Angelucci, E.;

Tango, J. S.; Tosello, Y.

**Coletanea do Instituto de Tecnologia de Alimentos**

3, 253-281 (1969/1970) [10 ref. Pt, en]

The possibility of storing screened green coffee for a 3-yr period in barns was investigated. The results showed that although some changes were observed in moisture content, sp. gr. and colour, the organoleptic characteristics did not change. These conclusions are valid for good quality green coffee, with a moisture content of 10-11%, stored in a metal barn, with natural ventilation passing from the bottom to the top. Even though the coffee was not transferred, as is the common practice, it was better than "in-bag" storage in a warehouse, or storage in an ordinary or elevator-type silo.

AS

## 67

**Coffee classifications.**

Munene, S. G.

**Kenya Coffee** 38 (452) 332-334 (1973) [En]

[Coffee Board of Kenya]

Coffee standards defined by the liquoring department of the Coffee Board of Kenya are summarized, including standards 1 to 6 (fine to poor), 7 to 10 (rejects) and clean buni classification.

RM

## 68

**[Method of decaffeinating raw coffee.]** Verfahren zur Entkoffeinierung von Rohkaffee.

Vitzthum, O.; Hubert, P. (Hag AG)

**German Federal Republic Patent Application**

2 212 281 (1973) [De]

Raw coffee is continuously decaffeinated by adjusting the moisture content to 10-60% water or water vapour, which solubilizes the coffee, then extracting the caffeine with liquid CO<sub>2</sub> which contains and is preferably saturated with water at above critical pressure, e.g. 80-400 atm. absolute, and a temp. between 0°C and the critical temp. of the CO<sub>2</sub>. The caffeine is subsequently removed from the solvent by adsorption, or by evaporating the solvent and reliquefying the CO<sub>2</sub> for recirculation. The roasted coffee obtained from the raw coffee treated as above tastes and appears the same as the untreated product.

W&Co





## 69

[Method of reducing content of irritants in coffee.]  
Verfahren zur Verminderung des Gehaltes an  
Reizstoffen im Kaffee.

Kaffee-Veredelungs-Werk Koffeinfrei Kaffee  
GmbH & Co.

**German Federal Republic Patent Application**  
2 212 171 (1973) [De]

Content of ether-soluble irritants and  
hydroxytryptamides in coffee is reduced without  
using an organic solvent by alternating (at least 3  
times) treatment with moist hot air (e.g. 120°C)  
with cooling at reduced pressure (e.g. a vacuum of  
100 torr). Content of ether-soluble irritants is  
reduced by 40-50%, and content of  
hydroxytryptamides is also reduced significantly.  
W&Co

## 70

[Animal experiments on the chronic toxicity of  
coffee and caffeine.] Tierexperimentelle  
Untersuchungen zur chronischen Toxizität von  
Kaffee und Coffein.

Strubelt, O.; Siegers, C.-P.; Breining, H.; Steffen, J.  
*Zeitschrift für Ernährungswissenschaft* 12 (4) 252-  
260 (1973) [37 ref. De, en] [Inst. für  
Pharmakologie, Med. Hochschule, Lübeck, Federal  
Republic of Germany]

In connection with the possibility of damage to  
the liver on prolonged intake of coffee or caffeine,  
experiments were carried out in which rats were  
given only coffee or caffeine solutions as their  
source of liquid for 6-7 months. Daily caffeine  
intake was 35-60 mg/kg. The controls were given  
decaffeinated coffee or water. No toxic effect or  
liver damage was observed in the experimental rats,  
although their body wt. was 6-7% lower than those  
of the contrls. summ.] controls. [From En summ.]  
HBr

## 71

[Filter for filter-units in boiling or infusion  
appliances for coffee, tea and the like.]

Filtereinsatz für Filteraufsätze an Aufbrüh- bzw.  
Aufgussvorrichtungen für Kaffee, Tee od. dgl.  
Busch, G.

**German Federal Republic Patent Application**  
2 218 081 (1973) [De]

Filter bag containing tea, coffee, etc., has a  
square, rectangular or trapezoidal shape, and inner  
and outer walls between which is enclosed the tea  
or coffee, the two walls being joined at their upper  
edges and either joined or spaced at their lower  
edges. Water is poured into the space in the middle  
of the filter bag, which is made of paper or other  
water-permeable material. The bags are vacuum  
packaged. W&Co

## 72

[The significance of coffee for the human organism.]  
Bucko, A.

*Ceskoslovenska Gastroenterologie a Vyziva* 27 (1)  
36-41 (1973) [39 ref. Sk] [Vyskumny Ustav  
Vysivy Ludu, Bratislava, Czechoslovakia]

A general discussion is given on the active  
substances in coffee, their effects on the central  
nervous and respiratory systems, and their use by  
persons with a labile nervous system. The effect of  
caffeine on the heart muscles and the relationship  
between coffee and blood pressure are also  
discussed. It is emphasized that no relationship  
between caffeine and blood circulation has been  
established. Other effects attributable to caffeine  
and/or coffee (which is mildly habit-forming but of  
a very low toxicity) are alleviation of migraine,  
relief of fatigue and counterbalancing of alcohol  
ingestion. STI

## 73

Method of extracting coffee oil containing aroma  
constituents from roasted coffee.

Hag AG

**British Patent** 1 336 276 (1973) [En]

The aroma constituents of roasted coffee are  
extracted with CO<sub>2</sub> under supercritical conditions,  
involving a closed cycle at pressures >80 atm. gauge  
and temp. >31.3°C; preferred pressure is 150-350  
atm., and preferred temp. 40-170°C. The resultant  
aroma oil product can be in the form of a free-  
flowing powder. IFT

## 74

[Method and apparatus for continuous  
countercurrent extraction of powdery materials.]  
Houghton-Larsen, E.; Kjaergaard, O. G. (AS Niro  
Atomizer)

**Danish Patent Application** 125 741 (1973) [Da]

Pulverulent material, particularly ground roasted  
coffee beans, is extracted by passing liquid  
countercurrently through the extraction zone under  
the effect of gravity, e.g. in an inclined cylindrical  
vessel with an upward feeding worm conveyor. The  
powder to be extracted is separated into fractions  
of different grain sizes, which are introduced into  
the extraction vessel such that the fraction having  
the largest grain size is added nearest to the outlet  
of the extraction liquid and the fraction having the  
smallest grain size nearest to the liquid inlet. The  
extraction time for each fraction is approximately  
proportional to the square of its mean particle size.  
W&Co

## 75

Instant coffee market booming in UK, total coffee  
sales at 50 million per year.

Winch, Y.

*Tea and Coffee Trade Journal* 146 (1) 32-33





(1974) [En]

Coffee drinking in Britain has tripled in the past decade, with instant coffee accounting for approx. 90% of the total. Special products discussed include Nestle's Continental Blend 37 and Gold Blend, both freeze-dried, Fine Blend a mild but not weak product made by a gentler percolation method, General Foods' Bird's Instant Mellow Coffee and Brooke Bond's Brazilian Blend. Owing to rising costs of raw materials, cheaper private labels and refill packs are increasing their share of the market. RM

## 76

**Per capita consumption of coffee down to 2.3 cups per day; increases shown in freeze-dried, decaffeinated segments.**

Anon.

*Tea and Coffee Trade Journal* 146 (1) 24-28, 71 (1974) [En]

Trends in US coffee consumption are reviewed. In contrast to the long-term decline, 1972 consumption increased by 2.6% to reach a total of 35.6 gal/capita. The Institutional sector showed a growth of 8.7%, while the household sector declined 0.2%, with a 1.3% drop in regular grind but a 3.7% increase in soluble purchases, of which decaffeinated (freeze- and spray-dried) increased by 15.1% and freeze-dried (decaffeinated and non-decaffeinated) by 19.2%. Corresponding decaffeinated and freeze-dried sector increases in the first quarter of 1973 were 39.5 and 44.0%. RM

## 77

**Aroma recovery and retention in concentration and drying of foods.**

Bomben, J. L.; Bruin, S.; Thijssen, H. A. C.; Merson, R. L.

*Advances in Food Research* 20, 1-111 (1973) [many ref. En] [W. Regional Res. Lab., Western Marketing and Nutr. Div., USDA, Albany, California, USA]

In this extensive review, concentration (water removal up to 50-60% solids) and dehydration (water removal up to >60% solids) are considered in relation to aroma retention. Aroma usually resulted from mixtures of many volatile compounds (possibly hundreds), present in minute concn. of ppm or ppb, differing widely and with no specific functional group and too complex to be reproduced artificially. Main approaches to aroma preservation are either its separation from the food prior to concn. and drying, with subsequent re-incorporation, or the operation of a selected water removal process with max. retention of aroma constituents. Recovery processes comprise aroma removal from the food and its concn. in a 2nd phase, which may be a gas (e.g. evaporation, inert gas stripping), a liquid (e.g. solvent extraction and evaporation) or a solid (e.g. charcoal absorption and elution). Model calculations are developed, with examples, for forecasting relative volatilities and selectivities relative to water from vapour pressures and activity coeff. A detailed review is

given of the major industry processes of separating the aroma from the food by evaporation, using steam stripping or flash heating, and its further concn. by distillation (rectification) as in fruit juice and instant coffee. Complications can arise in the presence of dissolved or insoluble solids, emulsions or a 2nd non-aqueous liquid. Gas stripping usually requires low temp. (e.g. CO<sub>2</sub>) and the solvent extraction process may involve difficulty with complete removal of solvent from the final product. Freeze concn. is particularly good for highly volatile aromas; crystallizers and methods of separating ice crystals are discussed. [Continued in following abstr.] ELC

## 78

**[Sterol composition of fruits, fungi, marine algae, tea, coffee and cocoa.]**

Oka, Y.; Kiriya, S.; Yoshida, A.

*Journal of the Japanese Society of Food and Nutrition [Eiyo to Shokuryo]* 26 (5) 317-327 (1973) [14 ref. Ja, en] [Dept. of Domestic Sci., Shikoku Women's Coll., Tokushima]

The sterol content in the unsaponifiable matter of lipids extracted from 28 fruits, 6 fungi, 10 marine algae, and 11 types of tea, coffee and cocoa was determined. The sterol content of fruits, tea, coffee, cocoa and brown and green algae is given as the quantity equivalent to that of  $\beta$ -sitosterol, while that of fungi and red algae is given as the quantity equivalent to that of ergosterol and cholesterol, respectively. The sterol portion, separated from the unsaponifiable matter by TLC, was analysed by GLC. The sterol content of fruits was in the range 0.6-59.9 mg/100 g edible part and 0.06-2.78 mg/g dried material; of fungi 14.7-46.6 mg/100 g edible part and 0.16-4.39 mg/g dried material; of marine algae 1.9-80.9 mg/100 g edible part and 0.02-1.38 mg/g dried material; of Bancha green tea 1140 mg/100 g edible part; of other green teas 326-411 mg/100 g edible part; of coffee 80-110 mg/100 g edible part (15 mg in powdered, instant coffee). The sterol content and composition of coffee beans were unchanged by roasting. [From En summ.] [See FSTA (1974) 6 3J397 for previous part.] JA

## 79

**Extraction process.**

Reimus, R. G.; Saporito, A.

*United States Patent* 3 783 632 (1974) [En]

Apparatus for removing water from coffee and tea extracts by first chilling to produce a suspension of solids in the liquid with subsequent formation of a mixture of ice and liquid is provided. The ice is separated in a centrifuge and washed. IFT

## 80

**Coffee extraction.**

Colton, M. S.; Schulman, M. (General Foods Corp.)

*United States Patent* 3 782 965 (1974) [En]

In a process for producing coffee extract by





bringing an aqueous extraction liquid into contact with progressively fresher roasted and ground coffee in the extraction columns of a percolator unit, the aqueous extraction liquid is defoamed using nonchemical means prior to passing it through the extraction column containing the freshest roasted and ground coffee. IFT

## 81

### Coffee extraction.

Mahlmann, J. P. (General Foods Corp.)

*United States Patent* 3 788 860 (1974) [En]

A process for producing coffee extract by bringing progressively fresher roasted and ground coffee into contact with an aqueous extraction liquid in the extraction columns of a percolator set involves contacting the roasted whole coffee beans with the aqueous extraction liquid in the fresh stage of the percolator set from which coffee extract is drawn off; drawing off a quantity of coffee extract from the fresh stage, thus completing a cycle; and then grinding the whole coffee beans prior to contacting them with aqueous extraction liquid in the autoclave section of the percolator unit. IFT

## 82

### [Agglomeration of instant powder.]

D.E.J. International Research Co. NV

*Netherlands Patent Application* 7 216 264 (1974) [Nl]

An aromatized and/or flavour-intensified, water-soluble powder agglomerate of edible material (coffee, cocoa, chicory, milk, coffee whiteners etc.) is obtained by fusing the primary particles and simultaneously distributing in the powder a water-immiscible, non-volatile, edible, organoleptically acceptable oil which contains the flavouring substances in solution. The oil is preferably sprayed as an oil-in-water emulsion on the powder which is kept in a rolling motion. The process is particularly suitable for agglomerating instant coffee powder, in which case coffee oil is used. W&Co

## 83

### Coffee sludge suspending agents.

Cascione, A. (General Foods Corp.)

*United States Patent* 3 783 165 (1974) [En]

Antifoam and sludge-suspending compositions comprising substituted lactylates are incorporated into instant coffee products. IFT

## 84

### Coffee aroma enhancers.

Procter & Gamble Co.

*British Patent* 1 339 417 (1973) [En]

A coffee substrate, the aroma of which is to be enhanced, is treated with an aroma-enriched carrier in a manner to minimize exposure of the carrier to air. IFT

## 85

### Recovery of vegetable aromatics.

Air Liquids

*British Patent* 1 338 679 (1973) [En]

Aromatic constituents of vegetable materials, especially coffee or tea, are collected by a gaseous mixture containing an inert gas difficult to condense, such as N<sub>2</sub> or He, along with a more easily condensable gas, such as CO<sub>2</sub>. The aromatic vapours are trapped on a snow-like structure formed in a condensing chamber and are recovered by sublimation. IFT

## 86

### [Increase in the content of aroma-forming substances in coffee extract.]

Kuz'min, V. I.; Vorob'eva, N. I.

*Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya* No. 3, 173-175 (1973) [3 ref. Ru] [Leningradskii Tekh. Inst. Kholodil'noi Promyshlennosti, USSR]

Hydromechanical extraction, in addition to intensive extraction of non-volatile coffee components and reduction of their losses, permits the temp. of the water-coffee mixture to be reduced. In this way more aromatic substances are preserved in the extract. Vapour and air mixtures of volatile substances over freshly made coffee, over a hydromechanical extract (at 50°C) and over a steeped extract (95°C) were analysed. The peaks of all three corresponded. The hydromechanical extract was 2.5 times more aromatic than the steeped extract (at 95°C). STI

## 87

Gases are produced everytime coffee is roasted. Why not figure out way to utilise them and make the coffee industry much more efficient?

Lee, S.

*Tea and Coffee Trade Journal* 146 (1) 70, 83 (1974) [En]

Utilization of coffee roaster gases is suggested, including recovery of solids by impinging hot gases on a chilled surface and purifying the crude caffeine, removing the liquid component by passing gases through a refrigerated coil, and compressing or liquefying the aromatic pure roaster gases for storage and distribution. Use of pure gas as an appetite stimulant, and stability during storage require further investigation. RM

## 88

### Utilisation of coffee by-products.

Rao, N. G.; Natarajan, C. P.

*Indian Coffee* 38 (1) 3-5 (1974) [11 ref. En] [Central Food Tech. Res. Inst., Mysore]

The utilization of coffee by-products (husks, pulp, spent grounds) as manure and fuel, as an additive for blending with roasted coffee powder (husks, up to 30%), for extraction of furfural,





as a microbiological medium, as cattle feed (up to 25% coffee skins or hulls in diet of calves or young cows), and in fermentation and allied industries (e.g. production of oil, caffeine, alcohol, vinegar) is briefly discussed. RM

## 89

**Removes water at cost of 1 to 2 cents/lb; concentrate losses below 0.1%.**

Anon.

**Food Processing 35 (1) 53-54 (1974) [En]**

Details are given of a commercial freeze concentration system, suitable for coffee, tea, juices, milk, and other liquid foods, which operates at almost 100% effectiveness while retaining natural volatiles and quality attributes. The cost of the water (ice) removal is reported to be 1-2 cents/lb for commercial operation; concentrate losses are <0.1%; impurities in melted ice crystals are under 50 ppm. The important aspects of the freeze concentration approach are: a unique crystallization technique creates large spheroidal ice crystals (0.2-30 mm), which facilitates separation from liquid concentrate; min. supercooling prevents loss of concentrate; the "wash column" separation technique is efficient and simple to operate; and as the entire process is within a fully enclosed system, the concentrate does not come into contact with the gas phase and thus volatiles are not lost. AA

## 90

**[Rapid gas chromatographic determination of caffeine in caffeine-containing and decaffeinated coffees with a nitrogen-sensitive detector.] Schnelle gaschromatographische Coffeinbestimmung in coffeinhaltigem und coffeinfreiem Kaffee mit dem Stickstoffdetektor.**

Vitzthum, O. G.; Barthels, M.; Kwasny, H.

**Zeitschrift für Lebensmittel-Untersuchung und -Forschung 154 (3) 135-140 (1974) [8 ref. De, en] [Wissenschaftliche Abteilung der Firma HAG AG, Bremen, Federal Republic of Germany]**

A rapid method is described for the determination of caffeine in commercial coffee samples. Automatically injected aqueous extracts are separated gas chromatographically using a nitrogen-sensitive flame ionization detector for quantitative evaluation. 5-aminoquinoline is used as internal standard. The data from the integrator are introduced by means of teletype and interface into a table-top computer for calculation and print-out of caffeine values. AS

## 91

**[Process for the recovery of coffee oil containing aromatic constituents from roasted coffee.]**

Verfahren zur Gewinnung von Aromabestandteile enthaltendem Kaffeeöl aus Röstkaffee.

Roselius, W.; Vitzthum, O.; Hubert, P. (Hag AG)

**German Federal Republic Patent Application 2 106 133 (1972) [De]**

Coffee oil containing aromatic substances and

antioxidant is extracted from roasted coffee with CO<sub>2</sub> in a cycle at supercritical pressure, i.e. >80, preferably 150-350 or ≤2000 atm. absolute pressure, and at supercritical temp., i.e. >31.3, preferably 40-170°C, to maintain its single-phase property and increase solubility. Other inert gases may be used instead of, or together with, CO<sub>2</sub>, e.g. SF<sub>6</sub>, CHF<sub>3</sub>, CHF<sub>2</sub>Cl, CF<sub>3</sub>Cl or C<sub>3</sub>F<sub>8</sub>, treatment temp. being calculated accordingly. The gaseous CO<sub>2</sub> is condensed to precipitate the oil, and then the CO<sub>2</sub> is removed by evaporation. To obtain aromatized coffee extract, this oil may be worked into coffee powder, or alternately coffee may be provided in the extraction vessel before starting, so as to adsorb and bind the oil and finally produce a free-flowing powder which may contain ≤40% oil without spoiling workability. Aroma of the oil varies with the extraction temp., e.g. 50-70°C gives a light, pleasant aroma, 130-150°C gives a heavy, smoky aroma. The oil comprises approx. 10-12% of the wt. of the coffee, is yellow to deep yellow, has no burnt smell, has an aroma count of 9-10 and a higher content of antioxidants than oil extracted by pressing. W&Co

## 92

**Freeze-dried coffee processing: a very basic explanation of this complicated technique.**

Sivetz, M.

**Tea and Coffee Trade Journal 146 (1) 74-75 (1974) [En]**

Freeze-drying vacuum processes for the manufacture of instant coffee are briefly outlined. In the Votator jacketed chill tubes, brine or propylene glycol is recirculated in 3 stage crystallization at 28°, 24° and 20°F. 4 basic freezing methods employ the Sandvik stainless steel belt, FMC Teflon-rubber belt, trays and the Atlas slicer machine. Granulation of frozen coffee extract is done by hammer mill, oscillating bar against a screen, rotary slicer or roller mill. Cold room (-40 to -45°F) design is also briefly discussed. New systems include the 10 min continuous freeze-drier with improved vacuum drying (Nestle & Leybold), the continuous oscillating conveyor/vacuum drier and the Conrad Atlas continuous tray drying system. Reduction of drying time by increasing drying temp. from 100° or 110°F to 130°F reduces product quality. Faster drying rate can be achieved by reducing granule size. Handling, addition of coffee oil and packaging of dry granules should be carried out in an N<sub>2</sub> atm. Moisture of freeze-dried granules is 1-2%, vs. 3-5% for spray-dried product, resulting in lower volatiles and aroma contents. RM

## 93

**Sensory and gas chromatographic profiles of coffee beverage headspace volatiles entrained on porous polymers.**

Tassan, C. G.; Russell, G. F.

**Journal of Food Science 39 (1) 64-68 (1974) [12 ref. En] [Dept. of Food Sci. & Tech., Univ. of**





California, Davis, 95616, USA]

A new method of capturing and concentrating headspace volatiles above brewed coffee beverages was investigated. It involved use of a porous polymer to concentrate volatile sample by selective removal of the water vapour present. Samples collected possessed a characteristic coffee aroma and, when chromatographed on packed glass columns, provided quantitative data on 44 peaks. 8 peaks had significantly different areas depending on whether the brew was prepared with distilled, hard, or soft water. Sensory evaluation of aroma of coffee brews made with the 3 types of water showed no significant differences. Aroma components present in the brew indicated that a compound, or group of compounds, had a characteristic coffee character. None of the chromatographically significant peaks were described as major contributors to the characteristic coffee aroma. Differences did exist between descriptions ascribed to whole coffee brews and those ascribed to individual components constituting that aroma. These differences may be attributed to either of 2 possible actions; blending and interaction of various compounds in aroma, some of which were subordinated while new aromas were created; or, differential threshold for coffee aroma compound(s) and other components. IFT

## 94

**Monosaccharides in roasted and instant coffees.**  
Kröplien, U.

*Journal of Agricultural and Food Chemistry* 22 (1) 110-116 (1974) [26 ref. En] [Coca-Cola GmbH, Essen, Federal Republic of Germany]

Monosaccharides of roasted and instant coffee were analysed. A 1-step procedure for quantitative isolation of monosaccharides from coffees was developed. The sugars were quantified by thin-layer densitometry of their coloured reaction products with 4-aminobenzoic acid. Roasted coffee extracts contained glucose (0-0.9%), fructose (0-0.9%), arabinose (0-0.1%), and sometimes a trace of galactose. Contents were low in dark and high in light roasts. Instant coffees contained arabinose (0.4-2.5%), galactose (0.2-0.9%), mannose (0.1-1.0%), glucose (0-0.3%), fructose (0-0.5%), and traces of ribose and xylose. Laboratory extraction of roasted coffees at temp. up to 200° proved that arabinose, galactose, and mannose were formed by hydrolysis of polysaccharides. The relative composition of the monose fraction is likely to reflect the hydrolysis conditions in the manufacture of instant coffees. AS

## 95

**Soluble coffee: shelf life studies.**

Harris, N. E.; Bishov, S. J.; Rahman, A. R.; Robertson, M. M.; Mabrouk, A. F.  
*Journal of Food Science* 39 (1) 192-195 (1974) [23 ref. En] [Food Lab., US Army Natick Lab., Massachusetts 01760, USA]

2 types of soluble coffee (spray dried and freeze dried) were packed in hermetically-sealed metal containers to test the effect of 3 different atmospheres (air, 2% O<sub>2</sub> in N<sub>2</sub> and "zero" O<sub>2</sub>) on the keeping quality of each product. Coffee containers were stored at 37.8°C for periods up to 12 months. It was found that the air pack had less deleterious effect on the flavour of freeze-dried coffee than was expected. In fact, N<sub>2</sub> packing of freeze-dried coffee may not be essential. Conversely the flavour of air-packed spray-dried coffee changed significantly after 9 months' storage at 37.8°C. After 12 months the consumer panel found this sample significantly less acceptable than all others. This suggests that low O<sub>2</sub> packs may be useful in protecting high moisture soluble coffees. CO<sub>2</sub> concn. in the headspace gases was independent of O<sub>2</sub> content and was a function of time. After 2 months' storage at 37.8°C, soluble coffees packed in the absence of O<sub>2</sub> developed undesirable odours reminiscent of shellac. These odours, however, were not perceptible in the reconstituted products. IFT

## 96

**Coffee brewing apparatus.**

Donot, G. R.

*United States Patent* 3 791 284 (1974) [En]

Apparatus for brewing and dispensing coffee into cups employs a single water circuit, in a part of which the water is cold and in the other part of which it is hot. IFT

## 97

**Precursors of sulfur-containing flavor compounds.**  
[Review]

Schutte, L.

*CRC Critical Reviews in Food Technology* 4 (4) 457-505 (1974) [173 ref. En] [Unilever Res. Div., Zevenaar, The Netherlands]

The occurrence and precursors of S-containing volatiles in foods are discussed, with special reference to: vegetables, especially cruciferous and alliaceous vegetables and heat-induced vegetable flavours; meat (chicken, beef, pork and lamb); seafood; bread, chocolate, coffee and roasted nuts; and mushrooms. The application of precursors in the flavouring of food is considered, details being given of the boosting of precursor levels by mineral nutrition, addition of flavour enzymes, nonenzymic precursor systems and synthetic precursors. Toxicological aspects are also covered. AA

## 98

[Addendum to a simple method for detecting Robusta coffee.] Ergänzungen zum einfachen Nachweis von Robusta-Kaffee.

Wurziger, J.

*Kaffee und Tee Markt* 23 (23) 4 (1973) [1 ref.]





De] [Chem. und

Lebensmitteluntersuchungsanstalt, Hygienisches Inst., Hamburg, Federal Republic of Germany]

It is pointed out that, in contradistinction to results with roasted Robusta coffee beans [see FSTA (1972) 4 12H1937], light petroleum extracts from raw Robusta coffee bean often show in the KI reaction a light green coloration making differentiation from raw Arabica coffee beans difficult. It was found that embryo oils from both types of raw coffee give the green coloration, the intensity being related to the oil content of the embryo, which is much higher in Arabica coffee. Extracts from raw germ-free Robusta coffee gave a pure yellow coloration, while corresponding extracts from Arabica coffee gave the green coloration characteristic for it. In roasted coffees, interference by germ oil was no longer evident. SKK

## 99

**Factors influencing the absorption of caffeine from coffee.**

Grab, F. L.

*Dissertation Abstracts International, B* 33 (9)

4210: Order no. 73-6426 (1973) [En] [Univ. of California, San Francisco, USA]

## 100

**[Determination of polycyclic aromatic hydrocarbons: technique and application to coffee oil.]**

Bracco, V.

*Rivista Italiana delle Sostanze Grasse* 50 (6) 166-176 (1973) [26 ref. Fr, de, en, it] [Soc. d'Assistance Tech. pour Produits Nestle SA, Lausanne, Switzerland]

A method for isolation and determination of polycyclic aromatic hydrocarbons (PAH) in coffee oils is described. It uses liquid-liquid extraction, TLC on caffeine-impregnated silica gel, and UV and fluorometric spectroscopy. Optimum conditions (recovery studies, fluorescence spectra) were determined by study of model mixtures and coffee oils extracted from green, roasted and soluble coffees and spent grounds. Extreme care must be taken to avoid contamination, e.g. from solvents, tap grease, plastics materials, which reduce fluorescence by an internal filter effect. Intensity of fluorescence is sufficiently stable to allow determination (no change occurring during 45 min). Analyses of coffee oils revealed 0.01 ppb (parts/billion) 3,4-benzopyrene in green and roasted coffees and spent grounds; none was found in soluble coffee oil. Pyrolysis products (pyrene, fluoranthrene) were present in roasted coffee and spent grounds, oil and soluble coffee at 2.6-3.29 ppb. The values are appreciably lower than those published for other vegetable oils e.g. soybean, groundnut (1.4 and 0.6 ppb 3,4-benzopyrene, respectively) which are affected by atmospheric pollution and by refining processes. RM

## 101

**[Gas-chromatographic determination of caffeine in coffee.]**

Carisano, A.; Riva, M.; Daghetta, A.

*Bollettino dei Laboratori Chimici Provinciali* 23 (6) 557-566 (1972) [8 ref. It, de, en, fr] [Lab. Ricerche Star SpA, Agrate Brianza, Milan, Italy]

A GLC method using a PFTD (parallel flame thermionic detector) for caffeine determination in coffee is described. This detector, particularly sensitive towards  $N_2$ , allows direct determination from raw extracts without previous clean-up. From 50 mg of caffeine added to 3 g decaffeinated coffee  $50.55 \pm 1.49$  mg, or  $101.1 \pm 2.98\%$  were recovered. Coeff. of variation and mean quantities of caffeine (% DM) in various coffees were: green coffee (9 replicates), 1.104 and 3.29%; decaffeinated (14 replicates), 0.0365 and 2.10%; soluble (8 replicates), 3.456 and 2.80%; and soluble decaffeinated (8 replicates), 0.1535 and 1.84%. Recovery of 50 mg added to decaffeinated coffee (9 replicates) was 50.55. The method is very accurate and sensitive and does not require much manipulation. RM

## 102

**Continued efforts needed in movement of coffee. [Lecture]**

Bederka, J.-M.

*Tea and Coffee Trade Journal* 146 (1) 42, 44-46 (1974) [En]

Handling and transport of coffee are discussed, with reference to pre-palletization and re-slinging of bags, and a combination of pre-slung coffee movement and LASH shipment (i.e. loading goods on individual barges and barges on a mother-ship, allowing barges to be loaded before arrival of ocean going vessel and significantly speeding turn-around time of mother-ship). RM

## 103

**Enzymatic fermentation of coffee.**

Arunga, R. O.

*Kenya Coffee* 38 (453) 354-357 (1973) [3 ref. En]

2 new pectic enzyme preparations Ultrazym 20 (U20) and 100 (U100) (Ciba-Geigy) were tested in 53 experiments in 9 factories with different climatic conditions (altitude 4000-6900 ft). Spraying of enzymes in a small quantity of water onto drained pulped coffee in a water-tight tank gave faster fermentation than under-water fermentation, and was recommended so as to avoid prolonged contact with water and consequent wt. losses and off-flavours. Dosage rate of 10 g U100/t clean coffee under warm conditions was sufficient for complete fermentation in 16 h, but at lower temp., 40 g/t were necessary. U20 had to be dissolved for 4 h before application. Recommended average dosage rates/t clean coffee are 25 g U100 or 125 g U20, adjustable according to temp. U100 is about 30





times stronger than any existing commercial preparation. Liquoring results showed no adverse effects on final product quality. Details of fermentation conditions and liquoring reports are tabulated. RM

## 104

### Preparation of quality coffee.

Souza, G. I. d'

*Indian Coffee* 38 (2/3) 44-45 (1974) [En]  
[Central Coffee Res. Inst., Coffee Res. Sta. PO,  
57/117 Chikmalagur Dist. Karnataka, India]

The main steps in the preparation of quality coffee are discussed, viz: collection of fully mature berries with rich, cherry-red colour; supply of clean water, for pulping on the day of harvest, at constant speed; correct fermentation in clean vats; preparation of clean parchment with clean water and complete separation of skins and floats; steady and continuous drying at the right depth of spread to correct standard wt.; and care during storage and transport to the curing house. RM

## 105

### Factors affecting Arabica coffee bean size in Kenya.

Cannell, M. G. R.

*Journal of Horticultural Science* 49 (1) 65-76  
(1974) [25 ref. En] [Coffee Res. Sta., Ruiru,  
Kenya]

The proportion of large, commercially valuable coffee beans (6.75 mm sieve) varies greatly within and between years in Kenya and is altered by field treatments which affect the water status, seasonal fruiting pattern and yield of the trees. Defoliation trials suggested that little of this variation could be attributed to changes in assimilate supply during fruit development, although these could explain differences in the wt. of the fruit pericarps. The largest differences in bean size recorded in past field trials at Ruiru were associated with differences in rainfall, and presumably tree water status, while the fruits expanded; the ovules did not reach full size when they expanded during dry weather. These conclusions are discussed in relation to the selective pressures that may operate in coffee's native forest understorey environment, and its tendency to 'overbear' in unshaded plantations. AS

## 106

### [Problems in the standardization of high-speed electrical instruments for determining the moisture content of grains and seeds.]

Guilbot, A.; Multon, J.-L.; Martin, G.

*Techniques des Industries Cerealieres* No. 132, 8-13 (1971) [10 ref. Fr] [Sta. de Biochimie et Physico-chimie des Cereales de l'INRA au Cerdia, 92 Massy, France]

Rapid moisture testers, based on electrical resistance or dielectric constant, require periodic

standardization against a reference method using a representative sample, assuming that there has been preliminary verification of the accuracy, sensitivity, and reproducibility of results obtained with the instrument. International reference methods for determination of moisture content are available for e.g. cereals, oilseeds, coffee. Suggestions for formulation of a precise text for standardization of calibration and checking are presented, based on the recommendations of a working group of the International Association for Cereal Chemistry. Test samples should comprise a single pure var. (preferably widely used in the particular country) with a min. content of impurities and damaged grain. A selection might be made from different lots to give a moisture range, but normally this is difficult, and it is recommended that a range of 12 samples containing 10-25% moisture be prepared by adding water to a very low moisture sample, equilibrating for  $\geq 72$  h and storing at 7°C. The reverse procedure of drying a high moisture sample was unsatisfactory (data given). Storage of high moisture grain can alter moisture results given by electrical equipment very seriously; maize is particularly difficult due to its high moisture content when harvested. [Continued in following abstr.] ELC

## 107

### [Problems in the standardization of high-speed electrical instruments for determining the moisture content of grains and seeds.]

Guilbot, A.; Multon, J.-L.; Martin, G.

*Techniques des Industries Cerealieres* No. 132, 8-13 (1971) [10 ref. Fr]

[Continued from preceding abstr.] The apparatus must be maintained at constant temp. and samples held at this temp. for 24 h before testing. For interpretation of results, a simple statistical treatment of differences between instrument readings and a single value by the reference method, to determine the variance and 5% confidence limits, is adequate in most (but not all) cases. ELC

## 108

### [Panorama of the Spanish food industry.]

San Jose, V.

*Tecnologia de Alimentos* 8 (5) 218-221 (1973) [3 ref. Es] [Quimico e Ingeniero Quimico, Fac. de Quimica Berzelius, Mexico]

Brief data, taken from an official organ of the Office of Commerce and Industry, published in Madrid in 1972, are given on the consumption and/or production in Spain for the period 1970-1972 of meat, vegetable preserves, dairy products, wheat flour, bread, food pastes, biscuits, sugar products, coffee, chocolate, sweets (nougat, caramels, chewing gum), oils and fats, and non-alcoholic beverages. HBr





## 109

**Some aspects of packaging of coffee.**

Rao, N. G.; Natarajan, C. P.

*Indian Coffee* 38 (2/3) 54-58 (1974) [12 ref. En]  
[Central Food Tech. Res. Inst., Mysore-13, India]

The protective packaging of coffee and its products (roasted, soluble, frozen extracts and green coffees) to ensure quality preservation and extend shelf life is discussed, with particular reference to vacuum or inert gas packaging in flexible bags of composite laminates. Data, taken from the literature, on the moisture and O<sub>2</sub> barrier properties, aroma permeability and resistance to grease and oils of 14 types of flexible film are tabulated. RM

## 110

**Glass offers new marketing opportunities for UK packers.**

Cook, R. F.

*Food Trade Review* 43 (10) 17-19 (1973) [En]

Increasing usage of jars and bottles for foods (excluding beers, beverages and dairy products) is due to 2 factors: increased consumption of such products as pickles, sauces and honey and the introduction of entirely new products in glass. Other topics considered are the success of marketing instant coffee in glass, the packaging of fruit and vegetables in glass on the Continent, the packaging of baby foods in glass jars and the scope for after-use containers. VJG

## 111

**[Contribution to the study of Mascarocoffea. Study of lipid and unsaponifiable fractions. Possible relationship between caffeine and chlorogenic acid contents.]**

Chassevent, F.; Dalger, G.; Gerwig, S.; Vincent, J.-C.

*Cafe-Cacao-The* 18 (1) 49-56 (1974) [17 ref. Fr, de, en, es] [Lab. de Recherches de l'IFCC, Nogent-sur-Marne, France]

The total lipid, unsaponifiable and phenolic acid contents of the beans from 21 species of Mascarocoffea were compared with cultivated coffee beans (Arabica and Robusta). Large variations were found between species, but differences from cultivated coffee were not systematic. Hexane-extracted lipids ranged from 4.5% (Coffee durbardi) to 37.0% (C. richardii), oleic acid from 0.3 to 22.0% and linoleic acid from 6.4 to 42.6%. While the wild coffee trees are related by the presence of heterosides not found in cultivated coffee and by the absence of caffeine (except for C. mauritiana with 45 ppm) they differ from each other in fatty acid composition, and acid and unsaponifiables contents. Chlorogenic acid contents were 0.1-1.9% of DM, vs 7.1% for Arabica and 9.2-9.6% for Robusta. No other phenolic acids were detected. The relation between low chlorogenic acid and caffeine content was noted. RM

## 112

**Coffee extraction.**

Adler, I. L. (General Foods Corp.)

*United States Patent* 3 798 341 (1974) [En]

A process for producing coffee extract involves bringing roasted and ground coffee into contact with an aqueous extraction liquor in a percolator unit in which the direction of flow of the aqueous extraction liquid through each of the extraction columns in one cycle is reversed in the next. IFT

## 113

**Coffee extracts.**

Lemonnier, P.; Cardozo, J.; Grandgury, G. (General Foods Corp.)

*United States Patent* 3 796 805 (1974) [En]

A process for producing coffee extract from a blend of  $\geq 2$  coffee var. of differing quality involves separately roasting and grinding each coffee var., separately loading each var. into an extraction vessel, and bringing the coffees into contact with an aqueous extraction liquid. IFT

## 114

**Decaffeinated coffee extracts.**

Hag AG

*British Patent* 1 346 134 (1974) [En]

Crushed, roasted coffee is extracted with a dry super-critical fluid to remove the coffee oil containing the aroma constituents. The residual material is first extracted with water and then extracted with super-critical CO<sub>2</sub> to remove caffeine. The residue is then again water extracted, and the extract spray-dried to yield a powder, which is aromatized by recombination with the coffee oil removed in the first step. IFT

## 115

**Devotees of natural health foods take an unjust dim view of decaffeinated coffee reflecting a prejudice in its growth stage.**

Lee, S.

*Tea and Coffee Trade Journal* 146 (2) 6, 44 (1974) [En]

Arguing that coffee decaffeination is an innocuous physical process free from chemical connotations, the author explains the process: green coffee beans are thoroughly steamed and caffeine extracted with an organic solvent (methylene dichloride or trichloroethylene) in accordance with its partition coeff. Removal and distillation of solvent allows recovery of caffeine and pure solvent. After extraction of 97-98%, beans are dried, roasted and ground in the usual way. None of the processes should be objectionable to health food advocates. RM





## 116

[Determination of degree of acidity in roasted coffee. Effect of extent of roasting on pH and acid and extract contents.] Zur Säuregradbestimmung in Röstkaffee. Einfluss des Röstgrades auf pH-Wert, Säure- und Extraktgehalt.

Hadorn, H.; Beetschen, W.

*Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene* 64 (2) 206-213 (1973) [6 ref. De, fr] [Zentrallab. der Coop Schweiz, Basel, Switzerland]

Aqueous extracts were prepared, according to Chapter 35 (in print) of the Swiss Food Handbook, from Pure Santos, Kenya and Robusta coffee varieties, each roasted to 4 colour grades (light to very dark), as well as from different types of commercial mixtures of roasted coffee, natural or decaffeinated and similar freeze-dried coffee extract varieties. Titration curves of the extracts were obtained potentiometrically, and expressed in m-equiv./100 g. They differed markedly depending on the pH (7-9) to which titration was carried out. On the basis of these tests, it is suggested that pH 8 should be adopted for titration in agreement with the earlier recommendation [see FSTA (1970) 2 7G272]. In the coffees examined, pH increased with degree of roasting, while titratable acidity and aqueous extract content decreased. SKK

## 117

[Soluble (instant) coffees, a developing industry.] Almedia, A. R. P.

*Reordenamento* No. 30, 9-13 (1973) [Pt]

Major differences are reviewed between the 2 major types of soluble coffee, viz. (i) spray-dried powder from a conc. liquid extract (65-75% water) and (ii) freeze-dried by sublimation of frozen water. Comparisons between identical original coffees processed by (i) and (ii) methods showed much better retention of the flavour and aroma of normal traditional coffee in the (ii) product, attributed to low temp.  $\leq 40-45^{\circ}\text{C}$  at any stage). For both types, a high quality extract is essential, but particularly for (ii). Poor quality coffee or unsatisfactory processing may yield a worse product with (ii) than with (i). Consumption of (ii) is slowly increasing in spite of its higher price (considered justified). Statistics for the USA (the largest world market) in 1971 and 1972 show that traditional coffee retained the major share of the market, but between 1971 and 1972 traditional and (i) coffee consumption declined by 1.3 and 4.9% respectively, while (ii) coffee increased by 9.7% (all based on green coffee). Consumption (%) of traditional, (i) and (ii) coffees respectively was in Canada (1970) 49, 40 and 11, but in the UK (1971) 10, 85, and 5; in particular, UK consumption of the agglomerated form of (i) has greatly increased. ELC

## 118

Cadmium and cobalt in tea and coffee and their relationship to cardiovascular disease.

Horwitz, C.; Linden, S. E. van der

*South African Medical Journal* 48 (6) 230-233 (1974) [33 ref. En] [Nat. Res. Inst. Occupational Diseases, Univ., Cape Town]

The Cd content of 5 teas, analysed by atomic absorption spectrophotometry, was found to average  $0.0298 \mu\text{g/g}$  tea, whilst that of 7 coffees averaged  $0.03 \mu\text{g/g}$  coffee. Bush tea had the lowest Cd content ( $0.017 \mu\text{g}$ ) and pure instant coffee powder the highest ( $0.035 \mu\text{g}$ ). As regards cobalt content, 5 teas averaged  $0.20 \mu\text{g/g}$  and 7 coffees  $0.93 \mu\text{g/g}$ . Again bush tea contained the lowest and a brand of pure instant coffee powder the highest cobalt contents. It would appear that tea and coffee provide only a very small proportion of the total intake of these elements, even with heavy drinkers, and no firm conclusions can be drawn concerning their toxicity from these sources. EJM

## 119

Agglomerated instant coffee resembles freeze dry but is less expensive.

Nair, J. N.; Sivetz, M.

*Tea and Coffee Trade Journal* 146 (3) 51-53 (1974) [En]

Principles of agglomerating spray-dried coffee and methods of producing agglomerates and of freeze-drying coffee extracts are described, including 4 different freezing methods: a moving, stainless-steel belt brine-cooled on under side with cold air blast above; a moving Teflon-coated rubber belt in a  $-45^{\circ}\text{F}$  cold room with air blast; Teflon-coated Al trays in a  $-45^{\circ}\text{F}$  room with air blast; and a vertical rotating refrigerated cylinder with continuous scraper. For granulation of frozen extracts, 4 types of granulator are in commercial use: rotary hammer mills; oscillating bar against screen; rotary slicer or cutter; and roast coffee bean grinding mill. Particles should pass 10% through a 6-mesh (3.3 mm) screen with  $<1\%$  through a 40-mesh (0.4 mm) to ensure a min. of fines. RM

## 120

[Presidential decree of 16 February 1973.

Regulation hygienic control of production and sale of coffee and coffee products.]

Italy, Presidente della Repubblica

*Bollettino dei Laboratori Chimici Provinciali* 24 (4) L262-L268 (1973) [2 ref. It]

Regulations on quality of coffee and coffee products are reproduced, covering green, roasted, ground and soluble coffees, imports and sale. Characteristics of 3 coffee varieties. (Coffea arabica, C. canephora and C. liberica) and permitted limits of impurities in green and roasted coffee are tabulated. RM





## 121

**Coffee.**

Anon.

*Monthly Bulletin of Agricultural Economics and Statistics* 23 (3) 24 (1974) [En] [FAO, Rome, Italy]

World production of coffee was 4 132 000 t in 1973 (preliminary figures), compared with 4 570 000 t in 1972. The statistical table also gives figures for coffee production in individual countries and compares them with figures obtained during the period 1961-1965, and in 1968, 1969, 1970, 1971 and 1972. Latin America produced the most coffee (2 508 000 t) with Brazil and Columbia as the main contributors with 1 026 000 and 516 000 t respectively. African countries produced a total of 1 217 000 t coffee, with Angola, Ethiopia, Ivory Coast and Uganda each contributing 170 000-210 000 t. MEG

## 122

[Package for powdered material, particularly pressed or evacuated material.]

Christensson, O. W. (Christenssons Maskiner & Patenter AB)

*Swedish Patent Application* 360 622 (1973) [Sv]

A package for particulate material, e.g. ground coffee, ground nuts, vacuum-packed to reduce O<sub>2</sub> pressure to a degree at which oxidation of fats or oils in the product is prevented, consists of an outer box of cardboard or similar stiff material and an inner casing of pliable but tough film or foil. Both components of the package are attached to one another at least along their rims. The inner casing is closed by a piece of plastics film or metal foil which is pressed onto the compressed material with a plane surface, and with its upright edges contacts the inner surface of the upper edge of the inner casing. The inner casing is formed from a blank to a shape matching the outer box. A press-on lid contacts the plane surface of the closure part of the inner casing with its plane centre area and with a downwardly opening circumferential groove grips the joined edges of the outer box, inner casing and its closure. The lid has an easy to open perforated line near the groove to permit removal of its entire plane centre area. W&Co

## 123

[Liquid- and gas-tight cardboard package and method for its manufacture.]

Christensson, O. W. (Christenssons Maskiner & Patenter AB)

*Swedish Patent Application* 361 640 (1973) [Sv]

Hermetically sealed package, particularly for roasted and ground coffee, consists of an outer box of cardboard or similar material and an inner casing of a thin, pliable, gas-tight material which completely covers the inside of the box. The outer

and inner casing are each folded from a coherent sheet having a bottom wall, side walls and corner parts folded against the inner surface of the side walls. The folding parts of the outer box are enclosed by the corresponding folds of the inner casing and their height is slightly less than that of the latter such that the uppermost edge of the outer box is formed of a single layer of cardboard only. The package is closed by a tight lid which encloses the upper edges of the outer and inner casing with a downwardly opening circumferential groove. W&Co

## 124

**Influence of freeze-drying parameters on the retention of flavor compounds of coffee.**

Petersen, E. E.; Lorentzen, J.; Flink, J.

*Journal of Food Science* 38 (1) 119-122 (1973) [13 ref. En] [A/S Atlas, 2750 Ballerup, Denmark]

Freeze-dried coffee powders were evaluated to determine effect of freezing method and chamber pressure during drying on retention of coffee flavour components. Headspace gas chromatography revealed 14 components of coffee aroma, but minor chromatograph peaks were removed from consideration, and evaluation was based on the total area of 8 remaining peaks. Results showed that volatile retention was greatest when slowly frozen samples were dried at low chamber pressure. Samples foamed prior to slow freezing showed sizably reduced retentions. Slowly frozen samples showed gradually decreasing volatile retention as pressure increased up to 0.7 torr, and drying at 0.8 torr resulted in a large reduction. Samples processed at different chamber pressures so as to give the same powder colour showed significant differences in their flavour retention. Almost all the test samples had higher volatile contents than commercial samples tested, though it cannot be sure that this does not reflect differences in coffee extracts. IFT

## 125

**Coffee extraction.**

Gallagher, W. E. (Procter & Gamble Co.)

*United States Patent* 3 800 055 (1974) [En]

A method for increasing the rate of extraction in a coffee extraction column involves superimposing a pulsating flow on the feed water of a conventional coffee extraction column. IFT

## 126

**Soluble coffee concentrates.**

Smith, H. L., Jr. (Smitherm Industries Inc.)

*United States Patent* 3 799 049 (1974) [En]

The production of a soluble coffee concentrate involves the green beans; softening and flaking the roasted beans; extracting the coffee solubles therefrom; concentrating the extract; and freeze-drying the extracted solubles in the concentrate. IFT





## 127

**Instant coffee.]**

Fukumoto, J.; Tsujisaka, Y.; Hashimoto, Y.  
*Japanese Patent* 4 912 710 (1974) [Ja]

Process for producing instant coffee is described in which roasted coffee beans are treated with a hemicellulase-containing solution. IFT

## 128

**Caffeine recovery.**

Zosel, K. (Studiengesellschaft Kohle mbH)  
*United States Patent* 3 805 619 (1974) [En]

A process for obtaining caffeine from green coffee by withdrawing the caffeine by means of recirculating moist CO<sub>2</sub> in supercritical state involves removal of the caffeine from the caffeine-loaded CO<sub>2</sub> by repeated treatment with water; and recovery of the caffeine and the water from the resultant dilute aqueous caffeine solution by recycling a stream of air or N<sub>2</sub> under a superatmospheric pressure. IFT

## 129

**Determination of fat in green coffee beans.]**

Padaryan, E. M.

*Konservnaya i Ovoshchesushil'naya Promyshlennost'* No. 1, 36-37 (1974) [Ru]

A study of different procedures for extraction and detn. of fat showed that results for fat content might vary significantly in relation to the extraction procedure used (especially time of extraction) and degree of grinding. Thus, single extraction gave 15.8% fat, single extraction with repeated grinding 17.51% fat, and refractometric detn. with  $\alpha$ -monobromo-naphthalene 17.91% fat. Analyses of 120 green coffee bean samples showed that the fat content varied from 11.97 to 17.91% and from 9.44 to 12.87%, respectively, for samples of arabica and robusta coffee. It was thus shown that the fat content is related to botanical variety. STI

## 130

**Spray-dried coffee.**

Huste, A. (General Foods Corp.)

*United States Patent* 3 798 342 (1974) [En]

A spray-dried soluble coffee of improved quality is produced by carefully controlling the spray drying conditions within specified limitations. The extract is conc. to a solids content of 31-40% and cooled to 30-60°F prior to drying (air inlet temp. 300-550°F, outlet temp. 190-230°F). Pressure at spray dryer nozzle is 700-2500 lb/in<sup>2</sup> (sufficient to produce droplets of  $\geq 100$ -300  $\mu$ m). IFT

## 131

**A new caramel compound from coffee.**

Kung, J.-F. T.

*Journal of Agricultural and Food Chemistry* 22 (3) 494-496 (1974) [4 ref. En] [Tech. Center, General Foods Corp., Tarrytown, New York 10591, USA]

A pleasant, buttery caramel aroma from a coffee aroma concentrate has been identified as the enol form of 2,3-pentanedione, 3-hydroxy-3-penten-2-one. The enol was also produced by injection 2,3-pentanedione into a gas chromatograph with a high injection port temp. (300°C or higher). The unknown was trapped and identified by IR and NMR. The enol could be stabilized as its trimethylsilyl ether and its structure was further confirmed by MS. AS

## 132

**[Gas chromatographic determination of caffeine in coffee.]** Gaschromatographische Bestimmung von Coffein in Kaffee.

Schilling, P.; Gal, S.

*Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 153 (2) 94-96 (1973) [11 ref. De, en] [Forschungsabteilung der Firma Haco AG, Gümliigen, Switzerland]

GLC determination of caffeine in all types of commercial coffee using a Varian 1800 GLC apparatus and pyrene as internal standard is described. Mean values with SD for 6 determinations were (% in DM): raw Arabica beans,  $1.19 \pm 0.041$ ; raw Robusta beans,  $2.29 \pm 0.083$ ; decaffeinated raw beans,  $0.023 \pm 0.0016$ ; roasted beans,  $1.05 \pm 0.035$ ; decaffeinated roasted beans,  $0.033 \pm 0.0022$ ; coffee extract,  $4.03 \pm 0.032$ ; and decaffeinated coffee extract,  $0.079 \pm 0.0016$ . The samples were supplied by ISO (International Organization for Standardization) and the results were in close agreement with those of collaborative tests by the UV spectrophotometric method of ISO-Levine [ISO/TC 34/SC 8/WG 2 'coffee']. SKK

## 133

**[Tablet of roasted and ground coffee or similar material.]**

D. E. J. International Research Co. BV

*Netherlands Patent Application* 7 311 711 (1974) [Nl]

A tablet of compressed roasted and ground coffee is reinforced by addition of homogeneously distributed inert fibres (0.1-5.0% by wt.) having a length/diam. ratio of 200-5 and a length of at least four times the mean diam. of the coffee particles (e.g. length 2-12 mm, diam.  $< 0.3$  mm). The fibres may be impregnated with additives which improve the shelf-life and/or the organoleptic properties of the product. Suitable fibres are e.g. cotton, hemp or jute; synthetic fibres (e.g. nylon, rayon, polyester, polyacrylic or polypropylene) which have a smooth surface are preferably subjected to a preliminary treatment to improve adhesion to the coffee particles. Besides improving the mechanical strength of the coffee tablets, addition of the fibres reduces





## 134

[Coffee and tea trade in the OECD.] Der Kaffee- und Tee-Aussenhandel im OECD-Raum. Anon.

*Kaffee und Tee Markt* 24 (5) 4, 6-7 (1974) [De]

Figures are quoted, mainly in terms of monetary value (US dollars), of imports of coffee during 1971 and 1972 into the Federal Republic of Germany, France, Italy, Netherlands, Sweden, UK and Canada, together with a breakdown of the sources of Germany's coffee imports. Imports and exports for the other OECD countries are also tabulated. Similar figures are given for trade in tea. HBr

## 135

[Award-winning rigid packs with protective edges.] Prämierte standfeste Raumpackungen mit Kantenschutz.

Schroers, F.

*Neue Verpackung* 27 (4) 502-503 (1974) [De]

A description is given of packs for products such as dried milk, ground or unground coffee, grated cheese, mixed nuts, baby foods and freeze-dried products. The packs, ranging from 30 × 50 × 65 to 100 × 200 × 500 mm size and from 50 to 7500 cm<sup>3</sup> capacity, are formed from a reel of material (Al foil, heat-sealable paper or combination materials, bleached coated kraft paper, etc.) and closed with an automatic PBS-Duomat machine at a rate of ≤45 packs/min. This machine permits packaging in a protective gas atm., giving residual O<sub>2</sub> levels below 0.5% for e.g. dried milk when used in conjunction with a worm-type metering machine. Reinforced edges give protection against mechanical stress. ADL

## 136

Detection of cashew nut shells in coffee, tea, and chicory.

Sengupta, P.; Sen, A. R.; Ghoshdastidar, N.; Roy, B. R.

*Journal of the Association of Official Analytical Chemists* 57 (3) 761-762 (1974) [5 ref. En] [Central Food Lab., 3 Kyd Street, Calcutta 16, India]

TLC has been investigated for the identification of cashew nut shell, one of the common adulterants in ground coffee, tea, and chicory. The ether extract of the sample is applied to silica gel G plates and developed with benzene-dioxane-acetic acid (90:25:4). Cashew nut shell shows 3 distinctive spots ( $R_f$  0.7, 0.54, and 0.34) with diazotized benzidine which are totally absent in tea, coffee, and chicory. The spots have been identified as anacardic acid, cardol, and anacardol, respectively. AS

## 137

10 H 1614

The effects of temperature and moisture content on the quality of parchment Arabica coffee during a 12 months sealed storage trial.

Stirling, H. G.

*Kenya Coffee* 39 (456) 73-79 (1974) [4 ref. En] [Tropical Stored Products Centre, Slough, Bucks., UK]

The effects of temp. and humidity were studied by storing parchment coffee in air-tight silos at 10, 17, 25, 30 and 35°C and 8.5, 10.8, 12.7 and 15.5% moisture content (MC); wet basis (equivalent to equilibrium RH of 47, 60, 70 and 80%), and analysing samples at monthly intervals for 1 yr. Quality assessment involved raw appearance, roast appearance and cup quality ('liquor'). Results are shown graphically and in a table. Rate of deterioration was fastest at high moisture and temp.: at 15.5% MC, rejection occurred within 3 months at 35°C and 5 months at 30°C; at 12% MC, within 4 months at 35°C and 12 months at 30°C; at 10.8% MC, within 8 months at 35°C. At these 3 MC, no significant quality loss occurred at 10 and 17°C during the 12 months. Over-dried coffee (8.5% MC) lost 2½ standards during 12 months at 35°C but was not rejected, while no change in quality occurred at the 2 lowest temp. All 3 quality factors were affected by storage conditions. For long-term storage, parchment coffee should be well-dried and stored in a cool dry environment. RM

## 138

[Development of several characteristics of Arabica coffee during experimental storage at 5 relative humidities and 4 temperatures.]

Multon, J. L.; Poisson, J.; Cahagnier, B.; Hahn, D.; Barel, M.; Santos, A. C. dos

*Cafe-Cacao-The* 18 (2) 121-132 (1974) [15 ref. Fr, en, es, de] [INRA, CERDIA, Massy, France]

Wet processed Arabica coffee was stored at 20, 25, 30 and 35°C, and 60, 75, 85, 90 and 95% RH. Samples were studied periodically up to 250 days for changes in water content, taste, colour and microflora. Results are shown graphically. Moisture content (MC) remained constant at all temp. and 60 and 75% RH, passed through a max. at 85 and 90% RH, and at 30 and 35°C and 95% RH, and rose steadily at 20 and 25°C and 95% RH. Sorption isotherms showed that the increase is due to a change in substrate affinity for water. At RH >80-85%, considerable increase in MC occurred in 55 days even at 20-25°C. Luminance increased slightly between 60 and 75% RH and fell between 75 and 95% RH. Cup quality deteriorated fairly steadily with increasing MC. Microbiological analysis employed a new sampling method, using 150 g coffee grains and direct dispersion in the medium. Bacterial population decreased during storage, especially at high temp. Mould grew very quickly at 85-95% RH, slowly at 75%, especially at higher temp.





No growth occurred at 60% RH. Moulds consisted mainly of *Aspergillus* spp. and a few *Penicillium* spp. (except at 35°C). No yeasts were observed. Results showed that a positive correlation exists between MC and mould growth; it is possible to draw an isochronal diagram of preservation according to mould development. RM

## 139

[Process for production of extract coffee with haze-producing substances.] Verfahren zur Herstellung von Extrakt-Kaffee mit Trübstoffen.

Mohr, Z. (Germany, Federal Republic of, Inge-Institut für Genusmittelforschung GmbH)  
German Federal Republic Patent Application  
2 227 875 (1974) [De]

Pentoses suspended in coffee extract, e.g. arabinose, ribose, galactose and mannose, are retained or recovered by preparing a solution of the precipitated and centrifuged pentoses and their polymerization products in an alkaline solution obtained by calcination of coffee skin or low-grade unroasted coffee, the ash being dissolved in hot water. The alkaline solution is filtered and the filtrate diluted, e.g. to 0.5%. The solution of the suspended materials (8.8%) can be spray-dried, alone or in combination (1:4) with a 30% extract-coffee solution. W&Co

## 140

[Process for agglomeration of extract coffee.] Verfahren zur Agglomeration von Extrakt-Kaffee.  
Mohr, Z.; Müller, S.; Stavenhagen, H. (Germany, Federal Republic of, Inge-Institut für Genusmittelforschung GmbH)  
German Federal Republic Patent Application  
2 227 879 (1974) [De]

A 10% aqueous coffee ash solution is boiled, filtered through a glass filter and after cooling saturated with CO<sub>2</sub>. The solution is then diluted with water to 1% and used for spraying onto a moving spray-dried coffee layer, 3-8 g solution being used/100 g coffee. The agglomerates formed are dried in the usual way. Agglomeration is improved by a chemical reaction between the coffee acids of the spray-dried coffee and the alkaline carbonate solution obtained from the coffee ash and the CO<sub>2</sub>. W&Co

## 141

[Method for the production of bacteria-free coffee infusion.] Verfahren zur Herstellung von mikrobiell einwandfreiem Kaffeesud.  
Pollak, H. W.

Swiss Patent 540 014 (1973) [De]

A coffee infusion, which may be stored for some time (e.g. 14 days) at room temp. without bacterial growth or deterioration of flavour, is produced under sterile operating conditions. Coffee beans are roasted at >200°C (or subsequently sterilized if roasting temp. is lower), and ground prior to infusion. The sterile coffee powder is exposed to an N<sub>2</sub>-atm., while the infusion water is heated to 100°C for 5 min and the infusion vessel sterilized with steam. The coffee powder is then introduced into infusion water in the container in a metal sieve. After infusion, the sieve is removed and the container is closed immediately. The liquid is heated to 85°C for ≥1 min, allowed to cool and then saturated with CO<sub>2</sub>. For consumption, the coffee is heated to 90-95°C and dispensed immediately. W&Co

## 142

[Common commercial roasted coffees in Ghana.] In Ghana handelsübliche Röstkaffees.

Wurziger, J.; Asomoa, Y.

Kaffee und Tee Markt 24 (6) 4-6 (1974) [4 ref. De] [Chem. und Lebensmitteluntersuchungsanstalt, Hygienisches Inst., Hamburg, Federal Republic of Germany]

Production ('000 60-kg sacks) of coffee by Ghana was 57 for both 1972/1973 and 1973/1974 (estimate); this is a considerable drop over the preceding yr, and continues the downward trend of the past 3 yr. The chemical composition of 3 samples of roasted Ghanaian coffee (Robusta var.) showed fat contents of 5.1-6.75%, carbonic acid hydroxytryptamide (C-5-HT) contents of 150-435 ppm and caffeine contents of 1.18-2.15%. For comparison, the C-5-HT contents of 5 Robusta coffees of different origins (Angola, Cameroon, Uganda, Congo, Ivory Coast) are tabulated. The colour reaction of steam distillates of 3 samples of roasted Ghanaian coffee with Gibb's reagent (an indication of the coffee's content of steam-volatile aroma compounds) is also given; 2 were typical of Robusta coffee, but the 3rd was not conclusive. HBr

## 143

Complex nature of coffee aroma.

Shankaranarayana, M. L.; Raghavan, B.; Abraham, K. O.; Natarajan, C. P.  
Indian Coffee 38 (4) 84-92 (1974) [32 ref. En] [Central Food Tech. Res. Inst., Mysore-13, India]

Information on flavour volatiles and non-volatiles occurring in coffee, their formation and significance for overall flavour is reviewed. Approx. 350 compounds identified in coffee volatiles are listed, including hydrocarbons, alcohols, phenyls, phenyl ethers, carbonyl compounds, esters, lactones, ketoalcohols, acids, acid anhydrides, heterocyclic compounds, and pyrazines. The formation of various groups of aroma volatiles, their possible precursors and mechanism of formation are tabulated. RM





## 144

## Coffee extraction.

Holzberg, I. (General Foods Corp.)

*United States Patent* 3 810 766 (1974) [En]

In a split-extraction percolation process, the solids concn. of the secondary extract stream is significantly increased by using a portion of this stream as a feed stream to the most-spent stage, a heated-water feed stream then being introduced. IFT

## 145

## Soluble coffee.

Howland, R. F.; Mansky, M. H.; Richards, W. J. (General Foods Corp.)

*United States Patent* 3 809 781 (1974) [En]

Soluble coffee of improved stability during storage is prepared by removing a portion of the aromatics from an aqueous coffee extract, drying the remaining extract, fixing the removed aromatics by mixing in solution with a fixative, freeze-drying the resultant solution, and adding at least a portion of the fixed aromatics to the dried extract remaining. IFT

## 146

## Dried coffee product.

Ganiaris, N. (Struthers Scientific & International Corp.)

*United States Patent* 3 809 775 (1974) [En]

In a process for preparation of liquid extract concentrate, carcinogenic elements are eliminated by precipitation from a chilled, decaffeinated extract solution, which is then dried. Caffeine is added to the liquid extract before drying and after removal of the carcinogenic elements. IFT

## 147

## Aromatized dry coffee.

Stolz, R. P. (General Foods Corp.)

*United States Patent* 3 809 766 (1974) [En]

An aromatized glyceride is distributed in discrete particle or droplet form onto the surface of a slab of partially frozen coffee extract, which is then completely frozen, comminuted and freeze-dried. IFT

## 148

## Coffee aroma modification.

Balling, T. T.; Mahlmann, J. P. (General Foods Corp.)

*United States Patent* 3 810 999 (1974) [En]

Aqueous aromas are outlined from roasted coffee by bringing roasted and ground coffee into contact with steam. The aqueous aromas produced

are preferably condensed and then partitioned with a glyceride, such as vegetable oil. The separate water and glyceride phases are used to aromatize soluble coffee products. IFT

## 149

## Coffee vending apparatus.

Schmidt, E. G. F. H. (Joh. Jacobs & Co.)

*United States Patent* 3 812 273 (1974) [En]

A vending machine for mechanical preparation of individual cups of filtered coffee is described. IFT

## 150

## Water quality becoming an increasingly important factor in coffee consumption.

Lee, S.

*Tea and Coffee Trade Journal* 146 (5) 38-39, 44 (1974) [En]

The effect of water quality of coffee flavour and methods for reducing the soluble solids content of water by ion exchange, electrodialysis and reverse osmosis are discussed. RM<sub>3</sub>

## 151

## Studies on ascorbic acid in coffee plants. I.

## Distribution in green fruits.

Vasudeva, N.; Gopal, N. H.

*Journal of Coffee Research* 2 (2) 23-26 (1972) [14 ref. En] [Div. of Plant Physiol., Central Coffee Res. Inst., Coffee Res. Sta., PO, Chikmagalur District, Mysore St., India]

Considerable quantities of ascorbic acid (vitamin C) were found in both the fruit wall and seeds of 5 coffee types studied (*Coffea arabica* var. Kents, S. 795 and S. 1934, *C. canephora* S. 274 and *C. excelsa*). Ascorbic acid was significantly greater (at 1% level) in seeds than in the fruit wall of all types except Kents. Fruit wall of *C. arabica* S. 795 contained significantly more (at 5% level) ascorbic acid than the other 4 types and in seeds it was in the following order: *C. canephora* S. 274 > *C. arabica* S. 795 > *C. arabica* S. 1934 > *C. arabica* Kents > *C. excelsa*. AS

## 152

[Lecture meeting 1973 of the DGF. Abstracts of lectures.] Vortragstagung 1973 der Deutschen Gesellschaft für Fettwissenschaft e.V. (DGF). Kurzreferate der Vorträge.

Anon.

*Fette, Seifen, Anstrichmittel* 75 (11) 625-635 (1973) [De]

[Continued from preceding abstr.] Short term feeding trials with methyl esters of dimeric fatty









28-33); Physiological effects (pp. 34-38); Brewing coffee beverage (pp. 39-46); Sales and marketing (pp. 47-51); and Instant coffees (pp. 52-58). An appendix is included which gives details of the National Coffee Association, Pan American Coffee Bureau, US Military and other agencies and also includes a bibliography. Over 100 illustrations are included. VJG

## 159

**[Calorimetric study of the coffee extract/water system.]** Kalorimetrische Untersuchungen an dem System Kaffee-Extrakt/Wasser.

Riedel, L.

**Chemie Mikrobiologie Technologie der  
Lebensmittel** 3 (4) 108-112 (1974) [18 ref. De,  
en, fr] [Bundesforschungsanstalt für  
Lebensmittelfrischhaltung, Karlsruhe, Federal  
Republic of Germany]

The enthalpy of Robusta coffee extract solutions of different strength was measured in the temp. range from  $-70^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$  using an adiabatic calorimeter. The fraction of water not freezing at the lowest temp. was approx. 0.3 kg/kg DM. A diagram is presented enabling determination of enthalpy differences between any temp. within the range studied for samples with water contents between 0 and 100%. Some more restricted data are also given for specific heats of raw coffee, roasted coffee and coffee oil. SKK

## 160

**Coffee brewing equipment gets better every year with new inventions galore.**

Anon.

*Tea and Coffee Trade Journal* 146 (4) 20-21, 23, 25 (1974) [En]

Recently introduced institutional/commercial coffee-makers are reviewed. RM

## 161

**[Method for chromatographic identification of gaseous phase components of foods.]**

Artem'ev, B. V.; Arkhiptsev, N. E.

*Izvestiya Vysshikh Uchebnykh Zavedenii.*

*Pishchevaya Tekhnologiya* No. 3, 157-160 (1973)

Using the equipment described in FSTA (1974) 6 2A85, the possibility of identification of GC peaks by addition of known substances to the gaseous phase condensate before its introduction into the chromatograph was studied. 12 of 20 different substances added to the condensate from a sample of roasted coffee gave peaks coinciding with corresponding peaks from the condensate alone and thus served to identify the original

## 162

### Drainage through coffee extract foam.

Chandak, A. J.; Chivate, M. R.

**Journal of Food Science and Technology, India** 11  
(1) 26-27 (1974) [12 ref. En] [Dept. of Chem.  
Tech., Univ., of Bombay, India]

Some investigations by photography of drainage through foams obtained from coffee extract are reported. Various theoretical models have been put forth by different workers to describe the interstitial flow for specific type of foams. The theoretical model put forth by Brady and Ross [Journal of the American Chemical Society (1944) 66, 1348] for foam drainage through thin vertical channels, bounded by non-rigid and parallel planes has been found to be valid in this study. AS

## 163

**O,O-Diethyl O-(2-isopropyl-4-methyl-6-pyrimidinyl) phosphorothioate; tolerances for residues.**

United States of America, Environmental  
Protection Agency

**Federal Register** 39 (134, July 11) 25487-25488  
(1974) [En] [Washington, DC, USA]

A tolerance of 0.2 ppm is established under the Federal Food, Drug and Cosmetic Act for residues of the title insecticide in or on coffee beans. CAS

## 164

**Coffee production in Latin America expected to drop sharply next year.**

Anon.

*Tea and Coffee Trade Journal* 146 (7) 32-33, 36 (1974) [En]

Coffee production estimates for Latin American countries in 1973/1974 are discussed by country for Brasil, Colombia, Costa Rica, El Salvador, Guatemala, Mexico, Nicaragua, Panama, Peru and Ecuador, Haiti and Trinidad. Total world production is estimated at 12.2 million bags or 16% lower than that of 1972/1973, with exportable production 22% lower. RM

## 165

### Study of the occurrence of ochratoxin A in green coffee beans.

Levi, C. P.; Trenk, H. L.; Mohr, H. K.

*Journal of the Association of Official Analytical Chemists* **57** (4) 860-870 (1974) [14 ref., En]  
[Tech. Center, General Foods Corp., White Plains, New York 10625, USA]





and a number of survey samples of coffee beans were analysed. *Asp. ochraceus* was found to be present in almost all samples but ochratoxin A was infrequently observed. Ochratoxin A production in sterile green coffee beans inoculated with *Asp. ochraceus* under optimal conditions was max. at 13 days at room temp. but the total amount was low (450 µg/kg). Considerable destruction (approx. 80%) of ochratoxin A occurred during a heat treatment which simulated the roasting of coffee beans. AS

## 166

[Investigation of the contents of carcinogenic polyaromatic hydrocarbons in various coffee varieties. I & II.]

Soos, K.; Fozy, I.

*Edesipar* 25 (1) 7-10; (2) 37-40 (1974) [22 ref. Hu, de, ru]

The method developed consists in extracting the coffee sample with benzene, followed by liquid-liquid partition between iso-octane and dimethyl sulphoxide, purification by column chromatography, using columns packed with Florisil, separation by TLC and determination of the individual components by UV spectrophotometry. The sensitivity of the method is 0.001-0.005 ppm, depending on the nature of the polyaromatic hydrocarbons. Values obtained are given. IF

## 167

New processing plant opens in Colombia.

Anon.

*Tea and Coffee Trade Journal* 146 (7) 20-22 (1974) [En]

A new coffee storage and processing plant near Medellin, Colombia, is described. It has 60 giant silos (21 ft diam., 100 ft high) storing 33 000 t parchment coffee under controlled temp. and moisture conditions. It can receive and store 55 t/h and process 130 t/8 h, including milling, sorting, classifying and bagging 1860 bags of 70 kg; as well as roasting 4 t coffee/h. All handling and storage facilities are self-cleaning and designed to prevent contamination, allowing the plant to handle other granular products (e.g. corn). RM

## 168

Coffee flavor enhancement.

Parliament, T. H.; Lipstein, M. E.; Clinton, W. P.; Scarpellino, R.; Soakup, R. J. (General Foods Corp.)

*United States Patent* 3 824 321 (1974) [En]

The flavour of coffee-flavoured foods is

## 169

[Method of agglomerating a powdered product and device for carrying out the method.]

Kleemann, T.; Rothmayr, W. (Societe des Produits Nestle SA)

*Swiss Patent* 550 605 (1974) [Fr]

Powdered product for preparing tea, coffee, drinking chocolate, and other beverages and foods, is agglomerated by contacting a stream of powdered material with a stream of saturated steam at 100-140°C and a stream of inert gas at 10-40°C, such as air, N<sub>2</sub> or carbonic anhydride. These 2 streams are coaxial with the powder stream, and may comprise a converging stream of steam while the gaseous stream is positioned between the 2 streams, or may be produced by suction forces due to flow of steam. Thus the powder particles are located in a turbulent zone, which improves contact with the steam and gas and contact between particles. W&Co

## 170

Coffee aromatization.

Patel, J. M.; Durchholz, R. F. (Procter & Gamble Co.)

*United States Patent* 3 823 241 (1974) [En]

A method is described for transferring the aroma of roast and ground coffee to a coffee aroma absorbant, such as an instant coffee to which coffee oil has been added. The method involves chilling the absorbant to a temp. of at least 40°F, and placing the chilled absorbant in contact with a zone charged with roast and ground coffee held at a higher vapour pressure than the vapour pressure of the chilled absorbant. IFT

## 171

Vitaminized coffee: should instant coffee producers offer consumers a 'Limey's' lesson?

Lee, S.

*Tea and Coffee Trade Journal* 146 (6) 6, 8 (1974) [En]

It is suggested that addition of ascorbic acid to instant coffee to provide 50 mg/cup could have beneficial effects for consumers. RM

## 172

[Method of preparing concentrated coffee.]

Societe des Usines Chimiques Rhone-Poulenc

*French Patent Application* 2 202 651 (1974) [Fr]

Liquid coffee is concentrated by subjecting it to ultrafiltration through a membrane which is obtained by aqueous heat treatment with or without drawing of a film made of a copolymer of acrylonitrile with an ionic monomer such as sulphonated polyarylethersulphone or phenoxy resin treated with epichlorohydrin and quaternized. The coffee filtrate is then subjected to reverse





osmosis, and the concentrates obtained from both processes are combined, and optionally freeze-dried to form instant coffee. The original flavour and aroma of the coffee are preserved in the product.  
W&Co

## 173

### [Use of cycloaliphatic compounds.]

Demole, E. P. (Firmenich SA)

*Swiss Patent* 549 953 (1974) [Fr]

Flavouring which may be added to foods and beverages, particularly tea and coffee to reduce bitterness and phenolic flavour, smoked meat, roasted cereals and nuts, and infusions and fermented drinks to which they may impart a flavour of caramel, comprises one of the following cycloaliphatic compounds: 2,6,6-trimethyl-cyclohex-2-ene-4-ol-1-one; 4,4,6-trimethylcyclohexa-2,5-diene-2-ol-1-one; acetate of 3,5,5-trimethylcyclohex-3-ene-1-yl; 3,5,5-trimethylcyclohex-2-ene-4-ol-1-one; 3,5,5-trimethylcyclohex-2-ene-1,4-dione; 2,2,6-trimethylcyclohexane-4-ol-1-one; 3,5,5-trimethylcyclohexane-4-ol-1-one; 3,5,5-trimethyl-4-methylenecyclohex-2-ene-1-one; 3,5,5-trimethylcyclohexane-1,4-dione; 3,5,5-trimethyl-4-hydroxy-4-(but-1-ene-3-one)-cyclohex-2-ene-1-one; 3,5,5-trimethyl-2-hydroxycyclohex-2-ene-1,4-dione; or 3,5,5-trimethylcyclohex-2-ene-2-ol-1-one. W&Co



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